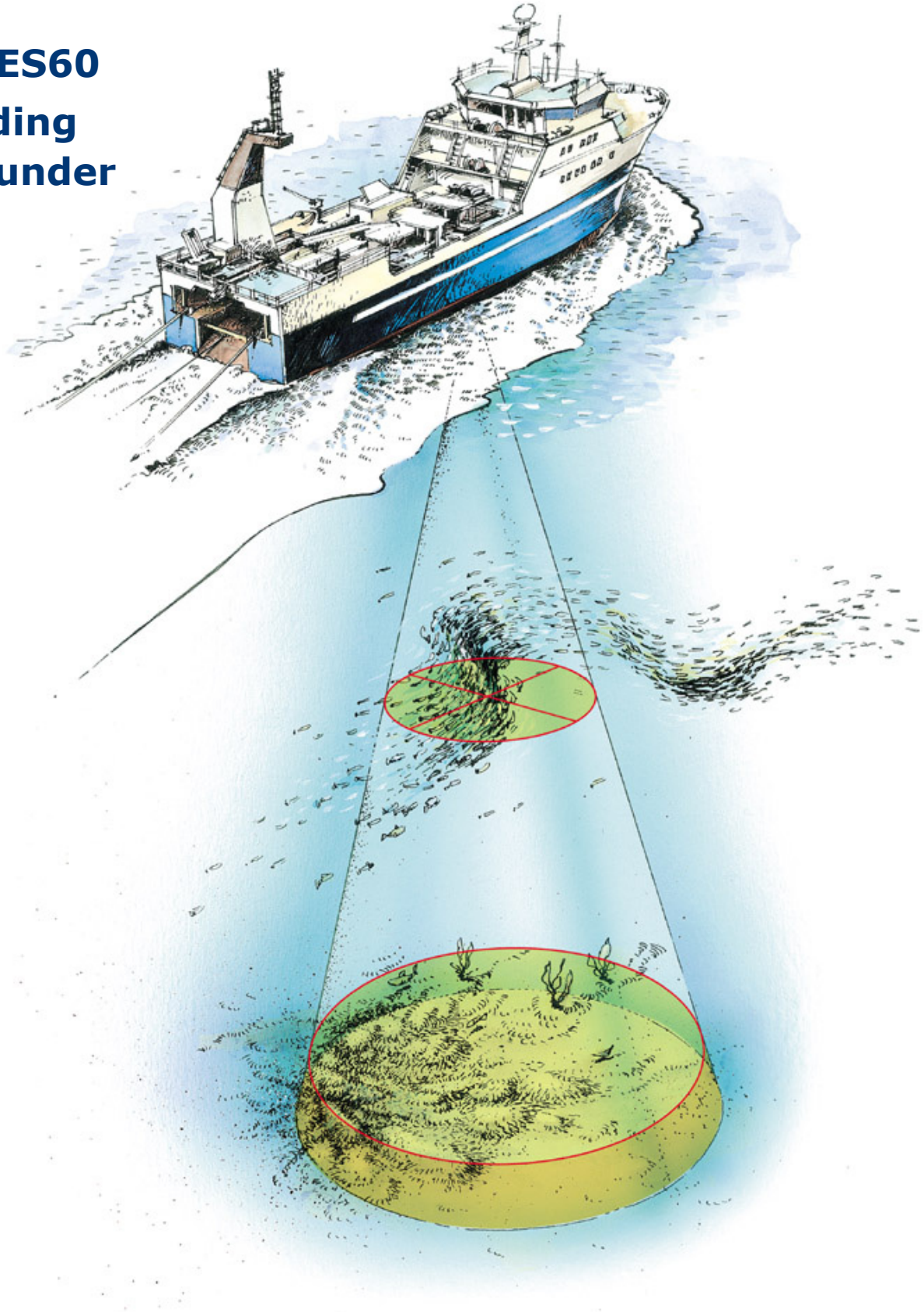
Installation manual

Simrad ES60
Fish finding echo sounder



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Simrad ES60

Installation manual

This manual provides you with the basic information required to install the Simrad ES60 Fish finding echo sounder. For more detailed information about the practical use of the product, refer to the *Operator manual*.

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Support

If you require maintenance on your Simrad equipment, contact your local dealer. You can also contact Simrad using the following address: contact@simrad.com. If you need other information about this product, or any other Simrad products, visit www.simrad.com. On our web site you will also find a list of our dealers and distributors.

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INTRODUCTION

The purpose of this installation manual is to present the descriptions and drawings required to install the Simrad ES60 Fish finding echo sounder system. The equipment described in this manual includes the complete system with associated cabinets, but not those system units provided locally by the customer, installation shipyard or local dealer.

The manual also defines the equipment responsibility, and provides instructions for unpacking and storage.

Note

Detailed vessel specific mechanical drawings for the installation must be provided by the customer, or any shipyard contracted to perform the installation. Simrad may, on special order, provide assistance to these drawings. Drawings must be approved by the appropriate vessel certification authority prior to installation of the system.

The installation instructions given in this document must be adhered to. Failure to do so may render the guarantee void.

Topics

Simplified system diagram on page 10

General safety rules on page 11

General supply conditions on page 12

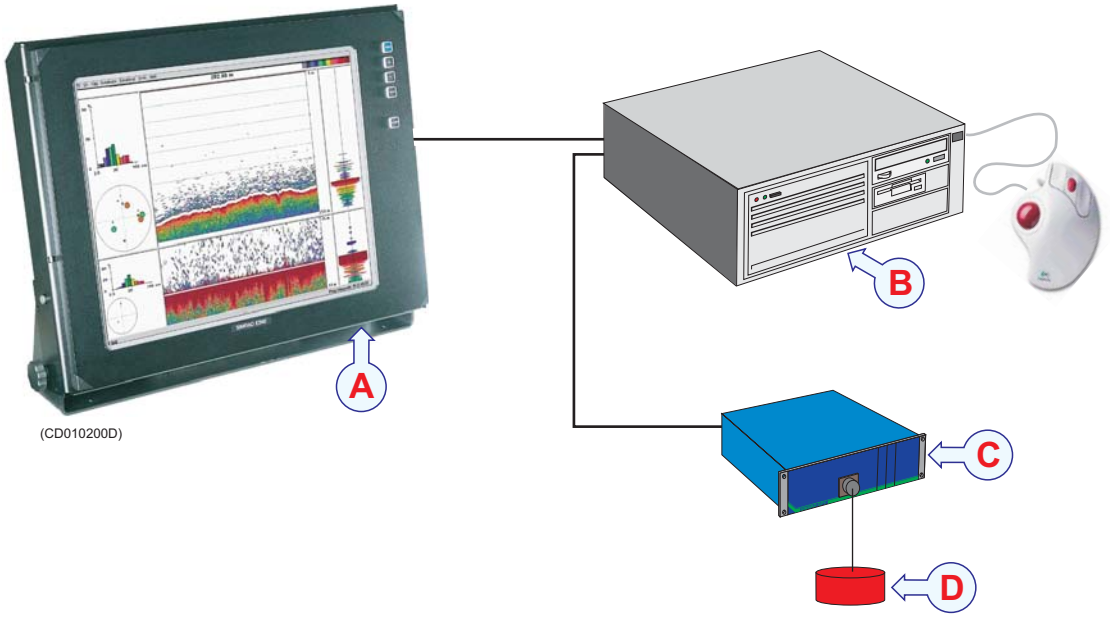
General installation requirements on page 13

Equipment handling on page 15

Simplified system diagram

A simplified system diagram is shown below.

System diagram with one transceiver



(A) = Colour monitor

(B) = Processor Unit (computer)

(C) = General Purpose Transceiver (GPT)

(D) = Transducer

General safety rules

The Simrad ES60 Fish finding echo sounder system operates on 230 Vac 50/60 Hz.

WARNING

This voltage may be lethal!

The following safety precautions must be followed at all times during installation and maintenance work:

- Always switch off all power before installation or maintenance. Use the main circuit breaker, and label the breaker with a warning sign that informs others that maintenance or installation work is being carried out on the system.
- Do not open the rack or cabinet doors while in rough seas. It may swing open suddenly and cause damage or injury.
- For safety reasons during troubleshooting on the equipment with power ON, two persons must always be present.
- Read and understand the first aid instructions for electric shock.
- Whenever maintenance is carried out, it is essential that a first aid kit is available, and that the maintenance personnel are familiar with the first aid instructions for electrical shock.
- The various parts of the system are heavy. Make sure that the appropriate tools and certified lifting equipment are available, and that the personnel are trained in installation and maintenance work.

General supply conditions

The following supply conditions are applicable to this Simrad ES60 Fish finding echo sounder delivery.

Equipment responsibility

The shipyard performing the installation and/or equipment dealer becomes fully responsible for the equipment upon receipt unless otherwise stated in the contract. The duration of responsibility includes:

- The period of time the equipment is stored locally before installation.
- During the entire installation process.
- While commissioning the equipment.
- The period of time between commissioning and the final acceptance of the equipment by the end user (normally the owner of the vessel which the equipment has been installed).

Unless other arrangements have been made in the contract, the ES60 Fish finding echo sounder system guarantee period (as specified in the contract) begins when the acceptance documents have been signed

Receipt, unpacking and storage

Upon accepting shipment of the equipment, the shipyard and/or the dealer should ensure that the delivery is complete and inspect each shipping container for evidence of physical damage. If this inspection reveals any indication of crushing, dropping, immersion in water or any other form of damage, the recipient should request that a representative from the company used to transport the equipment be present during unpacking.

All equipment should be inspected for physical damage, i.e. broken controls and indicators, dents, scratches etc. during unpacking. If any damage to the equipment is discovered, the recipient should notify both the transportation company andSimrad so that Simrad can arrange for replacement or repair of the damaged equipment.

Once unpacked, the equipment must be stored in a controlled environment with an atmosphere free of corrosive agents, excessive humidity or temperature extremes. The equipment must be covered to protect it from dust and other forms of contamination when stored.

For more information, refer to *Equipment handling* on page 15

General installation requirements

The following installation requirements are applicable to this Simrad ES60 Fish finding echo sounder delivery.

Approval by classification society

The ES60 Fish finding echo sounder transducer installation must be approved by Det Norske Veritas (DNV) or another classification society. The shipowner and shipyard performing the installation are responsible for obtaining installation approval.

Supply power

The supply voltage to the equipment is to be kept within ±10% of the installation's nominal voltage. Maximum transient voltage variations on the main switchboard's bus-bars are not to exceed -15% to +20% of the nominal voltage (except under fault conditions).

Simrad recommends that the ES60 Fish finding echo sounder is powered using an Uninterruptable Power Supply (UPS). The UPS should have the capacity to independently maintain power to the system for a minimum of 10 minutes. This ensures that the system can be switched off in a controlled manner in the event of a power failure.

Compass deviation

Once the installation is complete, the vessel must be swung with the system in both the operative and inoperative modes. The shipowner and captain are responsible for updating the deviation table accordingly with regard to the vessel's national registry and corresponding maritime authority.

Noise sources

The vessel's hull, rudder(s) and propeller(s) should be thoroughly inspected in dry dock prior to installation. Roughness below the water-line deformities in the shell plating and protruding obstacles can create underwater noise. These sources of turbulence must be smoothed or removed as best as possible. It is especially important that the propeller(s) is not pitted or damaged.

Dry docking

Make sure that ample clearance under the sonar trunk and/or protection blister is provided when dry docking the vessel. Avoid locating supporting blocks or structures in the vicinity of this equipment.

Note

The location of the transducer and/or protection blister must be noted on the vessel's docking plan for future reference.

Wiring

All cables running between system cabinets located in different rooms and/or on different decks must be supported and protected along their entire lengths using conduits and/or cable trays. Note that the cables must not be installed in the vicinity of high-power supplies and cables, antenna cables or other possible sources of interference.

Whenever possible, transducer cables must be run in steel conduits.

For more detailed information about cables and wiring, refer to *Basic cable requirements* on page 80

Equipment handling

This section provides the basic rules for transportation, storage and handling of units. In this context, a unit may be any large or small part of the system. It can be supplied as part of the initial delivery, or as a spare part.

Transportation

Unless otherwise stated in the accompanying documentation, electronic, electro-mechanical and mechanical units supplied by Simrad can be transported using all methods approved for delicate equipment; (by road, rail, air or sea). The units are to be transported in accordance with general or specific instructions for the appropriate unit(s), using pallets, transport cases, or carton boxes as appropriate.

Note

Special local restrictions concerning air transportation may be applied to units containing certain types of batteries. These units must be checked properly, and the regulations must be investigated by the packer/shipper before the unit is dispatched.

All local transportation must be carried out according to the same specifications as for the initial delivery. In general, all units must be handled with care.

The carton or case containing the unit must be kept dry at all times, and must be sheltered from the weather. It must not be subjected to shocks, excessive vibration or other rough handling. The carton or case will normally be marked with text or symbols indicating which way it is to be placed. Follow any instructions given, and ensure the case is always placed with its "top" uppermost.

The carton or case must not be used for any purpose for which it was not intended (step, table, etc.), and in the absence of other information, no other cartons or cases must be stacked on top of it.

Lifting

A heavy crate will normally be marked with its weight, and the weights of other cartons or crates will normally be entered on the packing list.

- You must always check the weight of a crate before you attempt to lift it.
- You must always use lifting apparatus that is approved and certified for the load.

Heavy units may be equipped with lifting lugs for transportation by crane within the workshop or installation area. Before you use a crane:

- You must check the applicable weight certificate for the crane.
- You must check the security of the lifting lugs.

Ensure that all available lifting lugs are used. Ensure the unit remains under control during the operation to avoid damage to the unit, equipment or personnel.

Heavy units may be transported using a forklift truck. Special attention must then be paid to the position of the unit's centre of gravity. The units must be properly secured to the truck.

Storage prior to installation or use

When a system, a unit or a spare part has been delivered to the customer, it may be subject to long time storage prior to installation and use. During this storage period, certain specifications must be met. The equipment must be preserved and stored in such a way that it does not constitute any danger to health, environment or personal injury.

1 The equipment must be stored in its original transportation crate.

2 Ensure that the units are clearly separated in the shelves and that each unit is easily identifiable.

3 The crate must not be used for any purpose for which it was not intended (eg. work platform etc.).

4 The crates must not be placed on top of each other, unless specific markings permit this.

5 The crates must not be placed directly on a dirt-floor.

6 Do not open the crate for inspection unless special circumstances permit so.

- "Special circumstances" may be suspected damage to the crate and its content, or inspections by civil authorities.
- If any units are damaged, prepare an inspection report stating the condition of the unit and actions taken. Describe the damage and collect photographic evidence if possible. Re-preserve the equipment.
- If the units are not damaged, check the humidity absorbing material. If required, dry or replace the bags, then re-pack the unit(s) according to the packing instructions.

7 If the crate has been opened, make sure that is it closed and sealed after the inspection. Use the original packing material as far as possible.

8 The storage room/area must be dry, with a non-condensing atmosphere. It must be free from corrosive agents.

9 The storage area's mean temperature must not be lower than -30° C, and not warmer than +70° C. If other limitations apply, the crates will be marked accordingly.

Note

Transducers must not be stored in temperatures below -20° C, or higher than +60° C.

10 The crate must not be exposed to moisture from fluid leakages.

11 The crate must not be exposed to direct sunlight or excessive warmth from heaters.

12 The crate must not be subjected to excessive shock and vibration.

13 If the unit contains normal batteries, these may have been disconnected/isolated before the unit was packed. These must only be reconnected before the installation starts. Units containing batteries are marked.

Caution

Units containing lithium or alkaline batteries must be handled separately and with care. Such units are marked accordingly. Do not attempt to recharge such batteries, open them or dispose of them by incineration. Refer to the applicable product data sheets.

Inspection

An inspection must be carried out immediately after the unit(s) have arrived at their destination.

1 Check all wooden or cardboard boxes, plastic bags and pallets for physical damage. Look for signs of dropping, immersion in water or other mishandling.

2 If damage is detected externally, you will have to open the packaging to check the contents. Request a representative of the carrier to be present while the carton is opened, so any transportation damage can be identified.

3 If any units are damaged, prepare an inspection report stating the condition of the unit and actions taken. Describe the damage and collect photographic evidence if possible. Send the inspection report to Simrad as soon as possible.

4 If the units are not damaged, check the humidity absorbing material. If required, dry or replace the bags, then re-pack the unit(s) according to the packing instructions.

Unpacking

General unpacking procedure

Normal precautions for the handling, transportation and storage of fragile electronic equipment must be undertaken.

Note

If the unit is not to be prepared for immediate use, you may consider storing it unopened in its original packing material. However, it may be useful to open the case to check its contents for damage and retrieve any accompanying documentation.

Do not use a knife to open cardboard cartons - the contents may lie close to the surface, and may be damaged by the blade.

---

1 Check the carton before opening it to ensure it shows no signs of dropping, immersion in water or other mishandling. If the carton shows signs of such damage, refer to the paragraph covering Inspection on receipt.

2 Place the carton on a stable work bench or on the floor with the top of the carton uppermost.

3 In the absence of other instructions, always open the top of the carton first. The contents will normally have been lowered into the carton from above, so this will usually be the easiest route to follow. Care must be used when opening the carton to ensure the contents are not damaged. Do not use a knife to open cardboard cartons

4 If the carton has been closed using staples, remove the staples from the carton as you open it. This will reduce the possibilities of scratch injury to yourself and damage to the contents.

5 If a wooden crate has been closed using screws, always remove them using a screwdriver. Do not attempt to prise the lid off with a crowbar or similar.

6 Once the carton is open, carefully remove all loose packing and insulation material. Check for manuals and other documents that may have been added to the carton during packing, and put these to one side. Check also for special tools, door keys etc.

Unpacking electronic and electromechanical units

Electronic and electromechanical units will normally be wrapped in a clear plastic bag. Lift the unit, in its bag, out of the carton and place it in a stable position on the floor/work bench.

Inspect the unit for damage before opening the plastic bag.

Note

Beware of the dangers of Electro-Static Discharge (ESD) both to yourself and to the equipment, when handling electronic units and components.

*Cables must **never** be used as carrying handles or lifting points.*

Do not break the seal to open a circuit board package before the board is to be used. If the board package is returned to the manufacturer with the seal broken, the contents will be assumed to have been used and the customer will be billed accordingly.

Assuming all is well, open the bag and remove the unit.

Open the unit and check inside. Remove any packing and desiccant material that may be inside.

Unpacking mechanical units

Mechanical units may be heavy. Using a suitably certified lifting apparatus, lift the unit out of the crate and place it in a stable position on the floor/work bench.

Inspect the unit for damage and remove any packing material that may be inside the unit.

Unpacking transducers

Transducers may be supplied mounted to a hull unit (if any), or packed separately. Crates are normally identified by the order number and the serial number.

The transducer face must be protected by a rigid, padded cover (e.g. a wooden box lined with foam rubber) all the time it is exposed to the risk of physical damage.

Caution

Once transducer is unpacked, great care must be taken to ensure that transducer body and cabling is not exposed to any mechanical stress.

Storage after unpacking

The unit must whenever possible be stored in its original transportation crate until ready for installation. The crate must not be used for any purpose for which it was not intended (eg. work platform etc.).

Once unpacked, the equipment must be kept in a dry, non condensing atmosphere, free from corrosive agents and isolated from sources of vibration.

Note

Do not break the seal to open a circuit board package before the board is to be used. If the board package is returned to the manufacturers with the seal broken, the contents will be assumed to have been used and the customer will be billed accordingly.

The unit must be installed in its intended operating position as soon as possible after unpacking. If the unit contains normal batteries, these may have been disconnected/isolated before the unit was packed. These must then be reconnected during the installation procedure. Units containing batteries are marked.

Note

Units containing lithium or alkaline batteries must be handled separately and with care. Such units are marked accordingly. Do not attempt to recharge such batteries, open them or dispose of them by incineration. Refer to the applicable product data sheets.

Storage after use

If a unit is removed from its operating location and placed into storage, it must be properly cleaned and prepared before packing.

Cleaning cabinets

If a cabinet has been exposed to salt atmosphere while it was in use, it must be thoroughly cleaned both internally and externally to prevent corrosion.

1 Wipe the cabinet externally using a damp cloth and a little detergent. Do not use excessive amounts of water as the unit may not be water tight. On completion, dry the unit thoroughly.

2 All surfaces must be inspected for signs of corrosion, flaking/bubbling paint, stains etc. Damaged or suspect areas must be cleaned, prepared and preserved using the correct preservation mediums for the unit. The mediums to be used will usually be defined in the units' maintenance manual.

3 Open the unit, and using a vacuum cleaner, remove all dust etc. from the unit. Great care must be taken to ensure the circuit boards and modules are not damaged in the process.

Mechanical units

If a mechanical unit may has been exposed to a salt atmosphere while it was in use, it must be thoroughly cleaned both internally and externally to prevent corrosion.

1 If the construction materials and type of unit permits, wash the unit using a high-pressure hose and copious amounts of fresh water. Examples are the lower parts of hull units (outside the hull) or subsea units

2 Ensure that all traces of mud and marine growth are removed. Use a wooden or plastic scraper to remove persistent growth, barnacles etc. On completion, dry the unit thoroughly.

Caution

Do not use a high pressure hose in the vicinity of cables or transducers. Do not use sharp or metal tools on a transducer face.

3 If the materials or type of unit prevents the use of a high-pressure hose, wipe the unit using a cloth dampened with water containing a little detergent. Examples are the upper parts of hull units (inside the hull) and hydraulic systems

4 Do not use excessive amounts of water as some components on the unit may not be water tight. Wipe off the detergent with a damp cloth, then dry the unit thoroughly.

5 All surfaces must be inspected for signs of corrosion, flaking/bubbling paint, stains etc. Damaged or suspect areas must be cleaned, prepared and preserved using the correct preservation mediums. The mediums to be used will normally be defined in the unit's maintenance manual.

Cables

Wipe clean all exposed cables, and check for damage. If a cable shows signs of wear or ageing, contact Simrad for advice.

Internal batteries

If the unit contains batteries, these may discharge slowly during storage. If the unit is to be stored for an extended period, disconnect or remove all internal batteries.

A suitable piece of insulating material can be placed between the battery and the electrical contacts to prevent electrical discharge. The battery can then remain in the unit, reducing the risk of it being misplaced during the storage period.

Caution

Units containing lithium or alkaline batteries must be handled separately and with care. Such units are marked accordingly. Do not attempt to recharge such batteries, open them or dispose of them by incineration. Refer to the applicable product data sheets.

Dehumidifier

Place a suitably sized bag of desiccant material (silica gel or similar) into the unit to keep the electronic components as dry as possible.

Coatings

Spray the unit externally with a corrosion inhibitor (e.g. a light oil) before packing.

Re-packaging

Whenever possible, the unit must be stored and transported in its original packing material and/or crate. In the event that this material is not available, proceed as follows:

- Small units must be protected from damp by being placed within a plastic bag at least 0.15 mm thick. An appropriate quantity of desiccant material should be placed inside this bag, and the bag sealed. The sealed unit must then be placed in an appropriate carton or crate, and supported in the container by appropriate shock-absorbing insulation (polystyrene foam chips etc.).
- Large units must be placed in a suitable cardboard box or wooden crate. The unit must be protected against physical damage by means of shock-absorbing insulation mats. The box must be clearly marked with its contents, and must be stored in a dry and dust-free area.

Circuit board packaging

Circuit boards are delicate items. They may work year after year in an advanced product, but then fail due to a small spark of static electricity. For this reason, it is very important that they are properly handled and protected during shipping.

Beware of ESD!

When you handle electronic circuit boards, you must beware of the dangers of electrostatic discharge (ESD), both to yourself and to the equipment. In order to ensure safe transport and storage, circuit boards and other electronic units will always be wrapped in a clear plastic protective bag, and the bag will be sealed.

See also: *What is ESD?* on page 24.

Unpacking and handling circuit boards

To unpack a circuit board:

- Wherever possible, prepare a suitable workbench. It must have an approved conductive service mat, and it must be connected directly to a reliable earth point via its earthing cord. You must wear a wristband in direct contact with the skin, and the wristband must be connected to the service mat.
- Lift the circuit board, in its protective bag, out of the carton and place it in a stable position on the a floor/work bench.
- Inspect the unit for damage before you open the plastic bag.
- Do not break the seal to open a circuit board package before the board shall to be used. If the board package is returned with the seal broken, we will assume that the content has been used, and we will bill you accordingly.
- Assuming all is well, open the bag and remove the unit.
- Take out and keep the documentation. You will need it if the circuit board shall be returned to us. Also, remove any packing and desiccant material that may be inside.
- Keep the protective plastic bag for future use.

Unpacking on board

When you are working on board a vessel, an “approved conductive service mat” is often far away. As you still need to unpack circuit boards, make sure that you do it in the instrument room, or at another location where you have a steel deck. Keep far away from the bridge or any other rooms with wall-to-wall carpets! If possible, bring a wristband and ground yourself.

Returning a circuit board

If you wish to return a circuit board to us, observe the following rules.

- Place the circuit board to be returned in the same protective plastic bag as you originally received it in - or a protective bag of similar ESD protection quality.
- DO NOT use standard plastic bags, such as commercial bubble wrap.

- Fill in all the necessary information on the applicable documentation and place it inside the bag.
- Seal the bag.
- Place the circuit board in a suitable carton, and secure it for shipping.

Note

Failure to follow these rules may result in unserviceable circuit boards.

Temperature protection

If the unit must be protected against extremes of temperature, the carton/crate must be lined on all walls, base and lid with 5 cm thick polyurethane or polystyrene foam. These units will be identified as delicate in the applicable documentation.

The package must then be clearly marked:

Must not be transported or stored in temperatures below -5 degrees Celsius.

Other units can normally be stored in temperatures between -30° C and +70° C, refer to the system's technical specifications for details.

Transducers must not be stored in temperatures below -20° C and above +60° C.

What is ESD?

Electro-Static Discharge (ESD) is the transfer of an electrostatic charge between two bodies at different electrostatic levels, caused either by direct contact or induction by an electrostatic field. The passing of a charge through an electronic device can cause localised overheating, and it can also "puncture" insulating layers within the structure of the device. This may deposit a conductive residue of the vaporised metal on the device, and thus create a short circuit. This may result in a catastrophic failure, or degraded performance of the device.

ESD protection

Sensitive electronic circuit boards must be transported and stored in protective packing bags. The circuit boards must not be transported or stored close to strong electrostatic, electro-magnetic or radioactive fields. If it is necessary to open and touch the circuit board inside the protective bag, then the following precautions must be taken:

- The working area must be covered by an approved conductive service mat that has a resistance of between 50 kΩ and 2 MΩ, and is connected directly to a reliable earth point via its earthing cord.
- The service personnel involved must wear a wristband in direct contact with the skin, connected to the service mat.
- Printed circuit boards must be placed on the conductive service mat during installation, maintenance etc.
- If, for any reason, it is necessary to move the circuit board from the conductive service mat, it must be placed in an approved antistatic transportation container (e.g. static shielding bag) before transportation.
- During installation and servicing, all electrical equipment (soldering irons, test equipment etc.) must be earthed.

INSTALLATION PROCEDURES

This chapter provides the basic information required to install the physical units.

Note

Physical installation of commercial units (computers, printers, displays) is not described in this manual. Refer to the applicable user manual(s) provided with the product.

Topics

Basic procedure on page 26

Configuration on page 27

General Purpose Transceiver installation on page 31

ES60 Marine Computer installation on page 33

Basic procedure

This is the basic installation procedure.

1 Check that you have received all parts required for the installation; cables, connectors, brackets etc.

2 Install the transducer(s) and the transducer cables according to the guidelines in this manual and the drawings provided with the transducer.

3 If applicable, install the two-wire cable for the temperature sensing thermistor.

4 Mount the Processor Unit (computer) and the display using the appropriate brackets.

5 Connect the computer and display cables:

- Power cable to display monitor.
- Power cable to computer.
- Video cable from computer to display monitor.
- Connect the pointing device (mouse or trackball)

6 Mount the General Purpose Transceiver using the appropriate brackets.

7 Connect the cables:

- Transducer cable(s)
- Power cable(s)
- If applicable, connect the cable from the temperature sensor.
- If available, install a two-wire cable for remote on/off of the General Purpose Transceiver(s).

8 Prepare and install the ethernet cable(s) between the General Purpose Transceiver(s) and the computer:

- An Ethernet cable must be used between the General Purpose Transceiver and the computer.
- If only one General Purpose Transceiver is used, you need a twisted pair cable with swapped receive and transmit wires. The cable is connected between the transceiver and the computer.
- An Ethernet switch is required if your system includes more than one General Purpose Transceiver. If a hub is used, all ethernet cables must be of the "straight through" type.

9 Prepare and install the required serial line interfaces.

- Connect navigation receiver, trawl system and heave sensor with serial line output to the rear of the echo sounder computer using RS-232 cables. Heave sensors with an analog output are connected directly to the **Auxiliary** connector of the nearest transceiver.

10 If required, prepare and install the synchronization cable(s).

- Synchronous transmission is desirable if there are several echo sounders on-board the vessel. For every echo sounder and every transceiver on-board the ship, connect the appropriate pins at the **Auxiliary** connectors together using a two-wire cable.

Configuration

The Simrad ES60 Fish finding echo sounder is designed as a modular system. It supports a variety of configurations and frequency options. The delivery may consist of:

- Transducer(s)
- General Purpose Transceiver(s) (GPT)
- Ethernet switch (if the system comprises more than one GPT)
- Processing Unit (computer)
- Display monitor
- Pointing device (mouse or trackball)

The computer, display monitor and pointing device may be provided locally using standard commercial components.

Transducer

One or more transducers are included. A single frequency General Purpose Transceiver will accept one transducer, while a dual frequency transceiver will accept two transducers.

A large number of transducers are available. There are several transducer alternatives for each operating frequency with different beam widths, power rating and mounting arrangements. All transducers are rated 60 or 75 ohms. Each has an efficiency of approximately 50%.

Related topics

Simrad transducers on page 143

Transducer Installation on page 110

General Purpose Transceiver (GPT)

One or more General Purpose Transceivers (GPT) are included.

A single frequency General Purpose Transceiver accepts one transducer, while a dual frequency transceiver accepts two transducers.

The General Purpose Transceiver is a small self-contained unit containing its own power supply. It operates on +12 Vdc or 115-230 Vac. The unit can be mounted anywhere on board the ship, provided that the location is dry and ventilated We recommend that it is mounted as close to the transducer(s) as possible. Power cable and mounting brackets are enclosed.

An Ethernet link connects the General Purpose Transceiver to the Processor Unit (computer). This link may comprise a standard Ethernet cable and - if necessary - an Ethernet switch. The transceiver includes its own Ethernet interface. A network interface board must be fitted to the computer.

The General Purpose Transceiver is available in single beam and split beam configurations. A dual frequency single beam configuration is also provided. The possible operating frequencies are listed in the technical specifications. Typical configurations include:

- GPT-S38(4)-F (single beam 38 kHz, 4 kW)
- GPT-S50(4)-F (single beam 50 kHz, 4 kW)
- GPT-S70(1)-F (single beam 70 kHz, 1 kW)
- GPT-S120(1)-F (single beam 120 kHz, 1 kW)
- GPT-S200(1)-F (single beam 200 kHz, 1 kW)
- GPT-Q38(4)-F (quad (split) beam 38 kHz, 4 kW)
- GPT-Q120(4)-F (quad (split) beam 120 kHz, 4 kW)
- GPT-S38(1)/S50(1)-F (single beam 38 and 50 kHz, 1+1 kW)

Two or more General Purpose Transceivers can exist on the same Ethernet cable. A multi-frequency sounder emerges simply by using several transceivers on the Ethernet cable.

- Example: A dual frequency split-beam sounder emerges by connecting two split-beam transceivers to the Ethernet cable.
- Example: A triple frequency single-beam sounder emerges by connecting three single-beam transceivers to the Ethernet cable.

Related topics

General Purpose Transceiver installation on page 31

General Purpose Transceiver specifications on page 107

Computer

The ES60 Processor Unit is a commercial computer, and it may be purchased locally. However, the ES60 Marine Computer can be provided, and we recommend this computer for maritime use, as it contains no moving parts. Microsoft© Windows© operating system is used. Power supply, a pointing device (mouse) and the necessary brackets for physical mounting are enclosed. The computer operates from 115 Vac or 230 Vac.

If you purchase a computer locally, it is important to ensure that the chosen model meets the functional requirements. Also, make sure that the computer design and construction allows for marine use and safe installation. A lap-top computer may also be used as long as it meets the functional requirements.

Minimum computer specifications

- **Operating system:** Microsoft© Windows© XP
- **Processor speed:** 1 Gb
- **Memory:** 512 Mb
- **Free hard disk space:** 1 Gb
- **Interfaces:**
  - One ethernet interface
  - One or more RS-232 serial line interfaces (depends on how many interfaces that are required for the specific integration)
- **Display resolution:** 1024 x 768

Related topics

ES60 Marine Computer installation on page 33

ES60 Marine Computer specifications on page 108

Display

A colour LCD monitor can be provided with the echo sounder system. Any commercial display can also be used, but it must be able to operate with a resolution 1280x1024.

Related topics

Colour display specifications on page 108

Software

All echo sounder configurations run identical software. The software automatically adapts to the number and type of installed transceivers during power-on. Upon delivery, the software is installed on the computer, as well as supplied on a CD-ROM. Software updates are distributed on a CD-ROM.

Printer

A printer can be supplied, or purchased locally. Most standard off-the-shelf colour printers can be used. A standard Windows driver is required, this is normally supplied with the printer.

General Purpose Transceiver installation

The General Purpose Transceiver (GPT) is a self-contained unit. It can be mounted anywhere on board the vessel. It is however recommended to mount the GPT as close to the transducer(s) as possible in order to minimize the electrical interference in the transducer cable.

The GPT is easily mounted with the brackets supplied with the unit.

Preparations

Two brackets and four pan head screws are enclosed. The side walls of the unit each hold six screws; three screws along the bottom edge and three screws along the top edge. The brackets can be vertically mounted in three different positions;

- Use the two rear holes, or
- Use the two centre holes, or
- Use the two front holes.

The brackets can be horizontally mounted in four different ways using either the bottom edge holes or the top edge holes.

The brackets can be horizontally mounted in four different ways using either the bottom edge holes or the top edge holes.

Procedure

1 Unscrew two screws from each side wall.

2 Mount the brackets using the pan head screws.

3 Position the unit on the surface and mark the four mounting holes.

4 Remove the unit, and drill mounting holes.

5 Mount the General Purpose Transceiver (GPT) using the appropriate brackets.

6 Mount the unit to the surface using 5 mm bolts.

External power supply

In order to avoid electrical noise, certain GPT configurations are supplied with an external power supply. This supply is mounted by means of two brackets. Observe the outline dimension drawing.

Related topics

GPT Outline dimensions on page 100

GPT Power supply outline dimensions on page 102

General Purpose Transceiver specifications on page 107

ES60 Marine Computer installation

The ES60 Marine Computer is an industrial computer. It is small, rugged, and contains no moving parts. This means that fans, hard disks and CD drives are omitted. The computer provides two ethernet sockets, four RS-232 serial lines and several USB connectors. The hard disk is replaced with a commercial 4 Gb flash disk.

The ES60 Marine Computer is easily mounted with the brackets supplied with the unit. A small external power supply is provided, and must be placed near the computer.

Preparations

Two brackets and eight bolts enclosed. Mount the two brackets at the bottom of the computer.

Procedure

1. Locate the most convenient location for the computer. Make sure that you can access both the rear and front side of the computer after it has been installed. In order to allow for future maintenance, mount the computer with its rear panel available for immediate access.
2. Observe the outline dimension drawing. Mark the location of the six holes provided on the two brackets.
3. Mount the unit using six bolts or screws.
4. When you install the cabling, make sure that the various adapter and cables are secured, and able to withstand vibration and the movements of the vessel.

Related topics

ES60 Marine Computer specifications on page 108

CABLE LAYOUT

This chapter describes the installation requirements for the Simrad ES60 Fish finding echo sounder cables. These instructions must be used together with the applicable cable plan.

Note

All electronic installations and corresponding wiring must be in accordance with the vessel's national registry and corresponding maritime authority and/or classification society.

If no such guidelines exist, we recommend that Det Norske Veritas (DNV) Report No. 80-P008 *«Guidelines for Installation and Proposal for Test of Equipment»* be used as a guide.

Topics

Cabling principles on page 35

ES60 Cable plans on page 36

Basic cable requirements on page 80

Related topics

Interfaces and integration on page 83

Cabling principles

Cable identifications

On the cable layout drawing and in the corresponding cable list(s), all cables are identified with individual cable numbers. Unless otherwise defined, each cable is identified with a **Cxx** number, where **xx** is an integer.

References are made to dedicated cable drawings. If required, the shipyard or owner may also identify the cables according to their own system. Unless otherwise specified, the ES60 documentation will however only refer to the identification numbers provided by Simrad.

Cable information

A drawing with additional specifications for each cable is provided. Each cable drawing may, when applicable, include:

- Required minimum specifications
- Connections at each end (including reference to the corresponding: system unit, terminal board identification and plug/socket to be used)
- Corresponding terminations
- Number of cores

System and shipyard cables

Cables fall into two categories.

- **System cables:** These cables are supplied by Simrad with the ES60 system delivery.
- **Shipyard cables:** These cables must be provided by the shipyard performing the installation, or the shipowner.

Note

Simrad accepts no responsibility for damage to the system or reduced operational performance caused by improper wiring.

ES60 Cable plans

Due to its modular design, the Simrad ES60 Fish finding echo sounder can be set up in a variety of configurations to suit individual needs for operational frequencies, split beam or single beam transducers and operational facilities. It is not practical to define specific cable plans for all these configurations.

To illustrate the cabling, the following basic cable plans are provided:

- Standard setup with one computer and one General Purpose Transceiver.
- Standard setup with one computer and more than one General Purpose Transceiver.

Note

The Simrad ES60 Fish finding echo sounder can be set up to work with maximum four -4- operational frequencies. This means that you can use four single frequency transceivers (single or split beam), two dual frequency transceivers, or any combinations of these.

Legend:

(A) = Display

(B) = Computer (The ES60 Marine Computer may be supplied)

(C) = General Purpose Transceiver (GPT)

(D) = Junction box for transducer cable (optional)

(E) = Transducer

(F) = Ethernet switch (required when more than one transceiver is used)

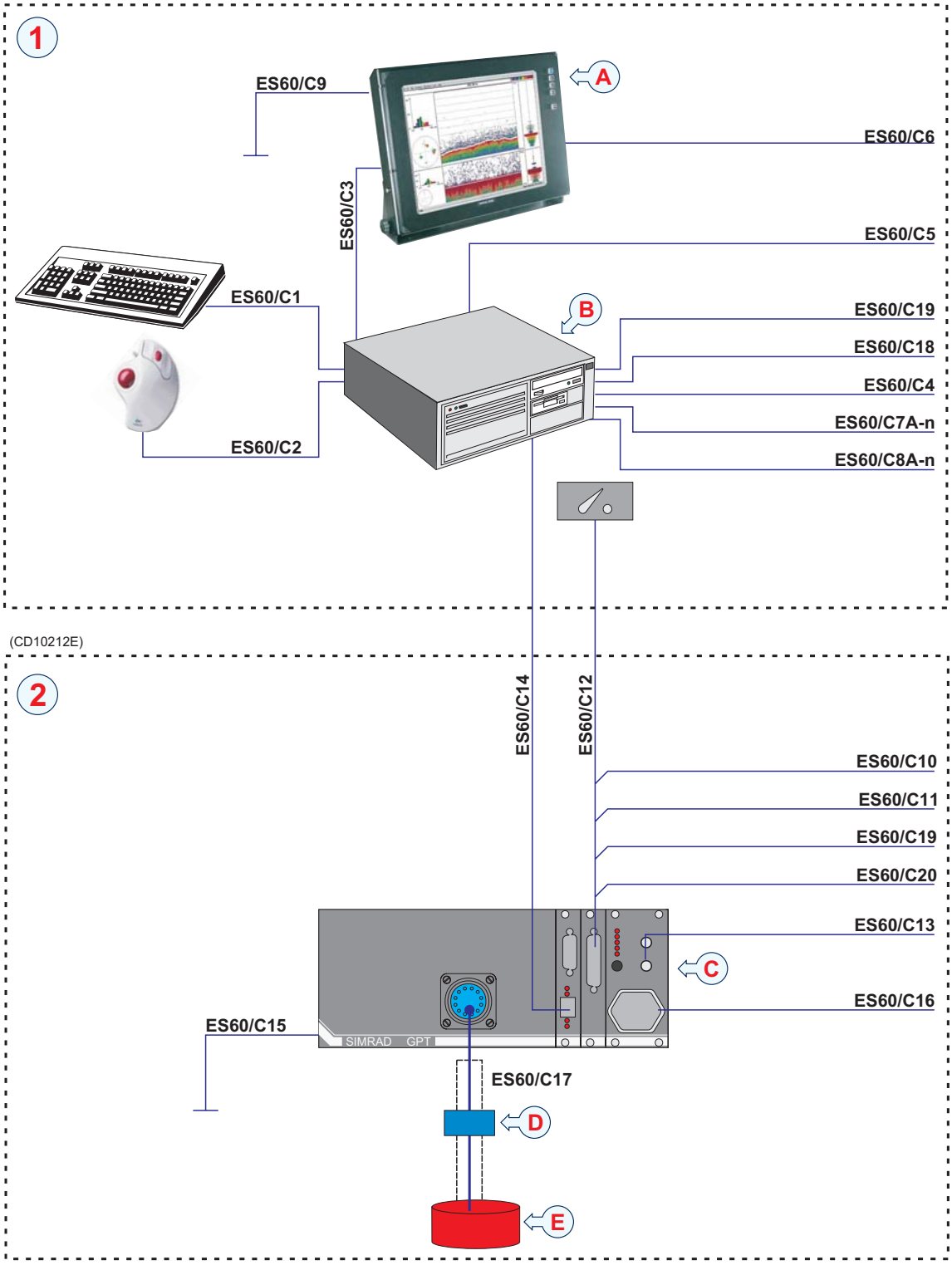
Topics

Cable plan with one transceiver on page 37

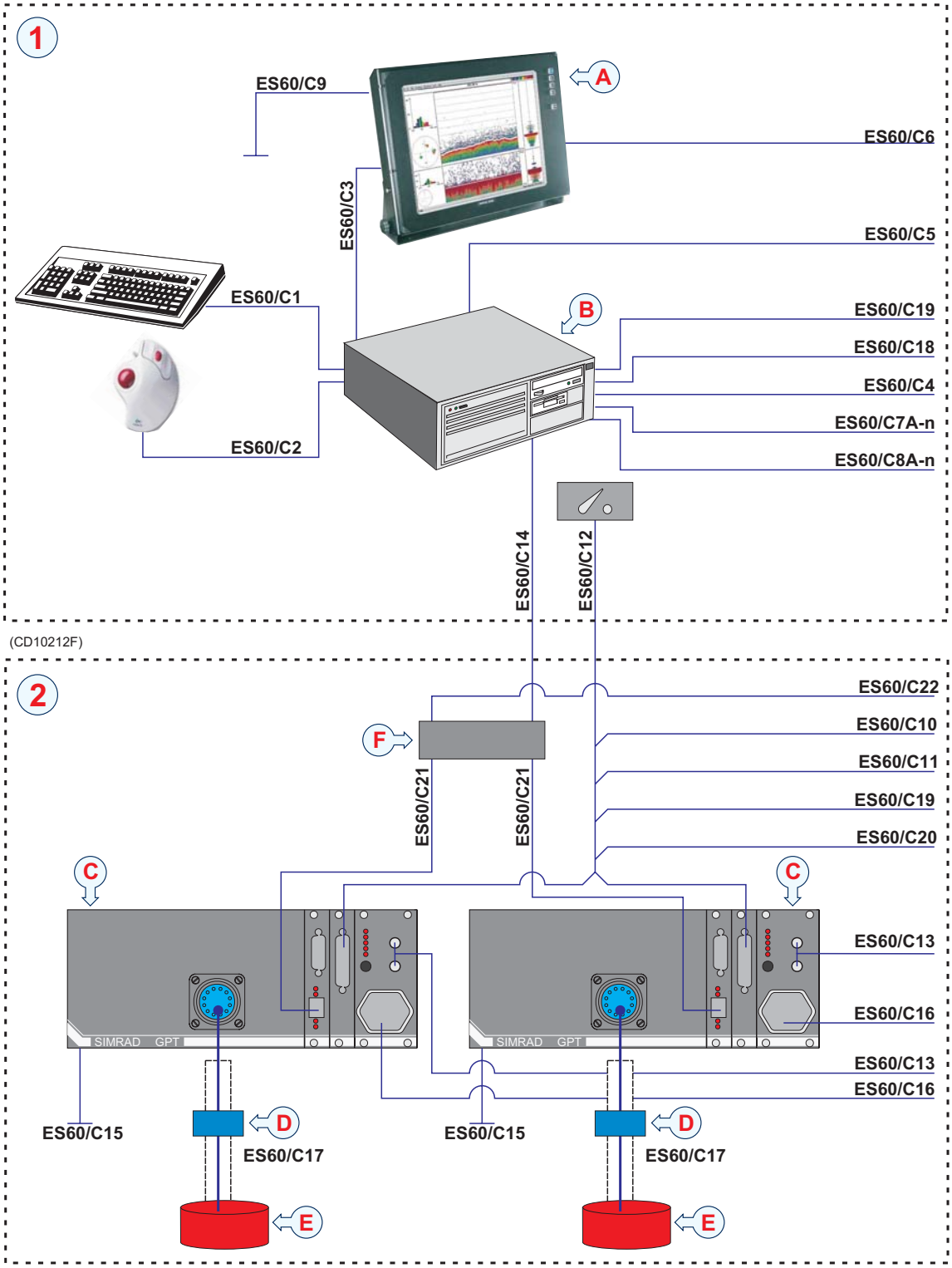
Cable plan with two transceivers on page 38

List of cables on page 39

Cable plan with one transceiver



Cable plan with two transceivers



List of cables

ES60/C01 - Keyboard

This is a standard keyboard cable, and it is usually fixed to the keyboard. A keyboard is not provided with the Simrad ES60 Fish finding echo sounder system. If you wish to connect a keyboard, you must provide it yourself. The connection depends on the make and model of the computer. PS/2 and USB plugs are the most common types.

The *ES60 Marine Computer* is provided with a single PS/2 connector to allow for both keyboard and mouse connection. If you wish to use only a mouse, it can be connected directly to this input. If you wish to use both a keyboard and a mouse, a special adapter is provided with the computer. Both the keyboard and the mouse must be equipped with a PS/2 connector. The *ES60 Marine Computer* is however also equipped with several USB sockets. The most convenient method would normally be to use these for both keyboard and mouse connections.

Adapter: *PS/2 Adapter for mouse and keyboard* on page 56.

ES60/C02 - Mouse (or other pointing device)

This is a standard mouse cable, and it is usually fixed to the mouse. A standard mouse or trackball device is provided with the echo sounder if you order a computer from Simrad.

ES60/C03 - Display

This is a standard display cable, and it is usually provided with the display. Note that several video formats are available. The VGA/SVGA format using a 15–pin D-sub connector is still the most common, but other formats have also been introduced. Which cable to use depends on the display you use and the video outputs provided by your computer.

Cable details: *VGA/SVGA Display cable* on page 54.

Note

You must never disconnect or plug in the display cable while power is applied to the computer!

ES60/C04 - Printer

A printer can be connected to the computer. A cable for this is normally provided with the printer. The most common interface formats are parallel (Centronics) and USB.

Cable details: *USB cable* on page 55.

ES60/C05 - AC power to computer

This normally a standard power cable, and it is provided with the computer. Ensure that the computer is set up to match the AC voltage you have available. Most computers will however operate on 115 Vac, 230 Vac or both.

The *ES60 Marine Computer* is provided with a separate power supply.

Cable details: *230 Vac power cable* on page 50.

ES60/C06 - AC power to the display

This normally a standard power cable, and it is provided with the display. Ensure that the display is set up to match the AC voltage you have available. Most displays will however operate on 115 Vac, 230 Vac or both.

Cable details: *230 Vac power cable* on page 50.

Note that some older display types may be fitted with a separate power supply.

ES60/C07 - Serial interface lines (RS-232)

Serial interfaces are used to connect the ES60 Fish finding echo sounder to other fish finding or navigation systems. All serial interface cables must be provided by the installation shipyard. If more than one serial cable is used, add the characters “A”, “B” to “n” to the cable identifier.

Cable details:

- *Generic RS-232 Serial line cable* on page 47
- *Cable between ITI and echo sounder* on page 64
- *Cable between PI44/54 and echo sounder* on page 65
- *Cable between PI30/32 and echo sounder* on page 66
- *Cable between SH/SP sonar and echo sounder* on page 67

Additional information:

- *About NMEA interfaces and telegrams* on page 83
- *Trawl system interface* on page 87
- *Catch monitoring system interface* on page 88
- *Navigation system interface* on page 90
- *Heave sensor interface* on page 90
- *Sonar system interface* on page 92
- *Depth interface* on page 94

The number of serial line interfaces depends on your computer make and model. For a typical integration of the ES60 Fish finding echo sounder, we recommend that minimum three serial lines are available. If your computer can not support this, commercial RS-232/USB converters are available.

The *ES60 Marine Computer* is provided with an adapter. This adapter allows you to connect four serial lines to the large interface socket on the rear panel of the computer.

Adapter: *Serial line adapter* on page 57.

ES60/C08 - Universal Serial Bus (USB)

Most computers support one or more USB connectors for peripheral devices. In a typical ES60 configuration, the USB connectors are not used. However, a USB interface may be used to accept serial line information (providing a converter is used). You can also use the USB interfaces to connect a mouse, keyboard, printer or memory devices.

The number of USB sockets available depends on your computer make and model. If more than one USB interface is used, add the characters “A”, “B” to “n” to the cable identifier.

Cable details: *USB cable* on page 55.

ES60/C09 - Ground

This cable is used to connect the display to ship’s ground. The cable must be supplied by the installation shipyard.

Cable details: *Ship’s ground* on page 51.

ES60/C10 - External synchronisation

This cable is used to connect the General Purpose Transceiver (GPT) to an external system in order to provide transmission control (synchronisation). This is a very useful feature if you have other hydroacoustic systems on board, and these transmit and receive on the same frequency (or harmonics of this frequency) as the ES60 system. The cable(s) must be supplied by the installation shipyard.

Note

*If more than one General Purpose Transceiver (GPT) is used by the echo sounder system, the synchronization signal **TrigIn** must be connected to all of them.*

Cable details: *GPT trigger / synchronisation* on page 59.

Additional information:

- *External triggering* on page 95
- *GPT Auxiliary connector* on page 96

ES60/C11 - External motion and temperature sensors

The General Purpose Transceiver (GPT) will accept information from external motion and temperature sensors. The cable(s) must be supplied by the installation shipyard. If more than one General Purpose Transceiver (GPT) is used by the echo sounder system, the motion and temperature sensors are connected to only one of them.

Cable details: *GPT external sensors* on page 60.

Additional information:

- *Heave sensor interface* on page 90
- *Temperature sensor interface* on page 92
- *GPT Auxiliary connector* on page 96

ES60/C12 - Remote on/off

The General Purpose Transceiver (GPT) allows you to design a simple box with a separate on/off switch for the transceiver. An on/off switch will prevent the transceiver from being powered up constantly. Some displays provide this functionality by means of a "Remote" connector on the rear side. The cable must be supplied by the installation shipyard. If more than one General Purpose Transceiver (GPT) is used by the echo sounder system, we recommend that you install one separate on/off switch for each unit.

Note

Do not use the spare wires in the ethernet cable to provide the remote control facility!

Cable details: *GPT remote on/off* on page 58.

Additional information: *GPT Auxiliary connector* on page 96

ES60/C13 - GPT battery supply

The General Purpose Transceiver Unit (GPT) can be powered from a DC supply. The power cable must be provided by the installation shipyard.

Cable details: *GPT battery* on page 63.

ES60/C14 - Ethernet cable between computer and transceiver

In a standard echo sounder configuration with only one General Purpose Transceiver, you must use a "crossover" ethernet cable between the computer and the transceiver. The ethernet cable must be provided by the installation shipyard.

If an Ethernet switch is used between the computer and the transceiver, “straight” cables must be used on either side of the switch.

Cable details:

- *Ethernet cable with RJ45, “crossover”* on page 53
- *Ethernet cable with RJ45, “straight”* on page 52

ES60/C15 - Ground

This cable is used to connect the General Purpose Transceiver Unit (GPT) to ship’s ground. The cable must be supplied by the installation shipyard.

Cable details: *Ship’s ground* on page 51.

ES60/C16 - AC power to the General Purpose Transceiver Unit (GPT)

This normally a standard power cable, and it is provided with the General Purpose Transceiver Unit (GPT).

Due to unfortunate properties of the commercial built-in power supply, certain transceiver configurations operating on 230 Vac will be supplied with a separate power supply. When this supply is used, the 230 Vac power cable is not used. The external power supply is connected to the battery inputs on the transceiver.

Cable details: *230 Vac power cable* on page 50.

Further details: *External power supply for transceiver* on page 49.

ES60/C17 - Transducer(s)

The Simrad ES60 Fish finding echo sounder can be used with a large variety of transducers. The large transducer connector on the General Purpose Transceiver Unit (GPT) has been prepared to accept all of them, provided that the appurtenant circuit boards are fitted to the unit. The following transducer types may be used:

- Single frequency, single beam (high or low power)
- Single frequency, dual beam (wide or narrow)
- Single frequency, split beam
- Dual frequency, single beam (combi transducers)

For the majority of the transducers, the cables are supplied from the manufacturer. These are normally physically fastened to the transducer.

Note

The distance between the General Purpose Transceiver and the transducer(s) must be as short as possible to avoid interference and noise.

If the distance between the transducer and the transceiver exceeds the length of the cable, a junction box must be used. The cable between the junction box and the transceiver must then be supplied by Simrad, and this must be the same type as used on the transducer(s).

For more information, see *Cable splicing* on page 140.

Note

All transducer cables must be run in steel conduits. Use flexible conduit close to the transceiver.

Cable shields must be connected to the plug housing.

Cable details:

- *Single beam, normal power transducer* on page 68
- *Single beam, high power transducer* on page 69
- *Dual beam (wide or narrow) transducer* on page 70
- *Split beam transducer* on page 71
- *Split beam transducer to single beam transceiver* on page 72
- *Single beam transducer to split beam transceiver* on page 73
- *Dual frequency, single beam transducer* on page 74
- *Deep water, split beam transducer* on page 75
- *ES38–10 transducer* on page 76
- *12-16/60 transducer* on page 77

ES60/C18 - Ethernet interface to ship's network

If the computer is equipped with two ethernet connectors, it may also be connected to the ship's local area network (LAN). A standard "straight" ethernet cable is required, and the cable must be provided by the installation shipyard.

Cable details: *Ethernet cable with RJ45, "straight"* on page 52.

ES60/C19 - Event

This input allows you to use a simple non-locking push-to-make switch as an event trigger. Every time the switch is depressed, a vertical line is drawn on the echogram. The cable, switch and mounting material must be provided by the installation shipyard. If more than one General Purpose Transceiver (GPT) is used, connect the **Event** switch to only one of them.

The **New line** feature is not used on the ES60.

Cable details: *GPT Event and New line* on page 61.

Additional information: *GPT Auxiliary connector* on page 96

ES60/C20 - Alarm output

This output allows you to implement an alarm sounder or lamp to indicate an echo sounder alarm condition. The output on the General Purpose Transceiver only provides a positive (+5 Vdc) level unable to power any external devices directly. If you wish to use this function, you must therefore design an external device containing an opto-coupler or relay to sense the alarm output. This device can then trigger secondary devices such as sounders or lamps. The cable, devices and mounting material must be provided by the installation shipyard. If more than one General Purpose Transceiver (GPT) is used, the alarm output on only one of them is used.

Cable details: *GPT Alarm output* on page 62.

Additional information: *GPT Auxiliary connector* on page 96

ES60/C21 - Ethernet cable between Ethernet switch and transceivers

When two or more General Purpose Transceivers are used, these are connected to the computer by means of an Ethernet switch. Cable **ES60/C14** is used between the switch and the computer, this is a “straight” ethernet cable. For each transceiver, one **ES60/C20** cable is used. Each of these are also “straight” ethernet cables.

Cable details: *Ethernet cable with RJ45, “straight”* on page 52.

ES60/C22 - Supply power to Ethernet switch

Most Ethernet switches are supplied with a separate power supply.

Cable details: *Commercial power supply* on page 48.

Cable details

This chapter provides details cable drawings offering cable specifications and termination information.

Cables

Generic RS-232 Serial line cable on page 47

Commercial power supply on page 48

External power supply for transceiver on page 49

230 Vac power cable on page 50

Ship’s ground on page 51

Ethernet cable with RJ45, "straight" on page 52
Ethernet cable with RJ45, "crossover" on page 53
VGA/SVGA Display cable on page 54
USB cable on page 55
PS/2 Adapter for mouse and keyboard on page 56
Serial line adapter on page 57
GPT remote on/off on page 58
GPT trigger / synchronisation on page 59
GPT external sensors on page 60
GPT Event and New line on page 61
GPT Alarm output on page 62
GPT battery on page 63
Cable between ITI and echo sounder on page 64
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Single beam, normal power transducer on page 68
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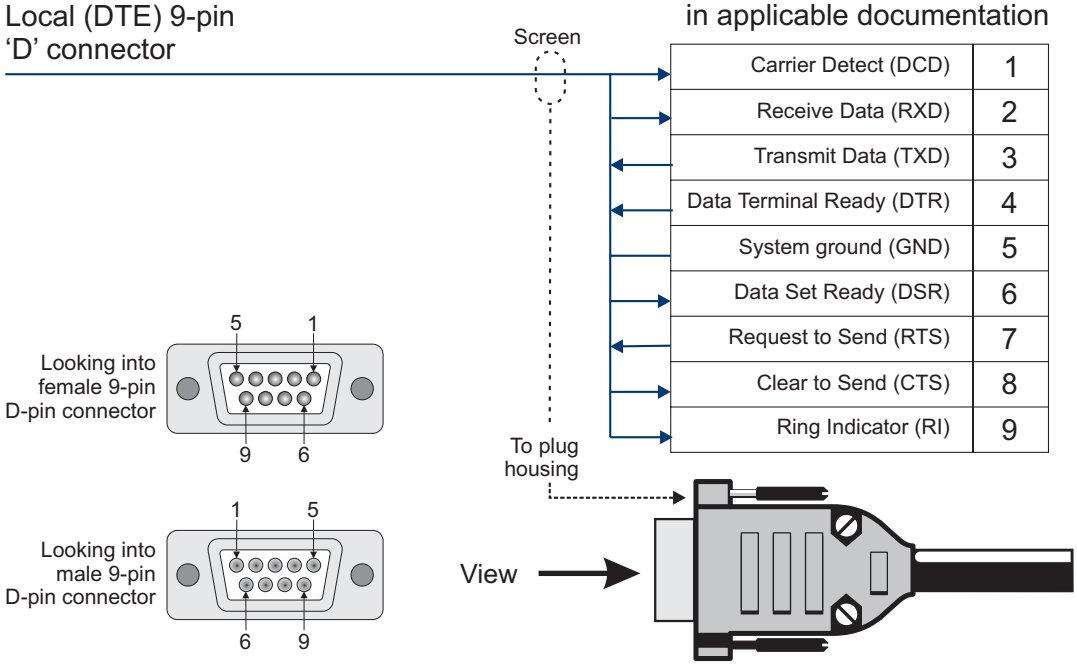
Dual beam (wide or narrow) transducer on page 70
Split beam transducer on page 71
Split beam transducer to single beam transceiver on page 72
Single beam transducer to split beam transceiver on page 73
Dual frequency, single beam transducer on page 74
Deep water, split beam transducer on page 75
ES38–10 transducer on page 76
12-16/60 transducer on page 77
50/200 Combi C transducer on page 78
38/200 Combi C transducer on page 79

Generic RS-232 Serial line cable

This cable comprises a multi purpose serial line. It provides interface with any peripheral unit. One end of the cable connects to the local unit (DTE) with a 9-pin D-sub connector, while the other connects to the peripheral (DCE) as described in the peripheral unit's documentation.

Note that in most cases, only the **RXD**, **TXT** and **GND** wires are used.


Remote unit (DCE) to be connected as described in applicable documentation
Local (DTE) 9-pin 'D' connector
Screen
Carrier Detect (DCD) 1
Receive Data (RXD) 2
Transmit Data (TXD) 3
Data Terminal Ready (DTR) 4
System ground (GND) 5
Data Set Ready (DSR) 6
Request to Send (RTS) 7
Clear to Send (CTS) 8
Ring Indicator (RI) 9
5 1
Looking into female 9-pin D-pin connector
9 6
1 5
Looking into male 9-pin D-pin connector
6 9
To plug housing
View

W104 Rev D	Standard RS-232 serial line

- Conductors: 9 x 2 x 0.5 mm2
- Screen: Screened twisted pairs and overall braided
- Voltage: 60 V
- Maximum diameter: Limited by the plugs

Commercial power supply

This is a standard commercial power supply. The input is normally 115 and/or 230 Vac, while the output voltage and power capacity is set up to match the device it shall be used with. A large variety of these power supplies exist. Some will also have an in-line power “box”. These types will have an AC power cable on one side, and the DC output supply cable on the other.

The power supply is fitted with plug to suit the national standard.
(British standard shown as example only.)

Plug type and electrical properties on DC output are set to fit the device to be powered.

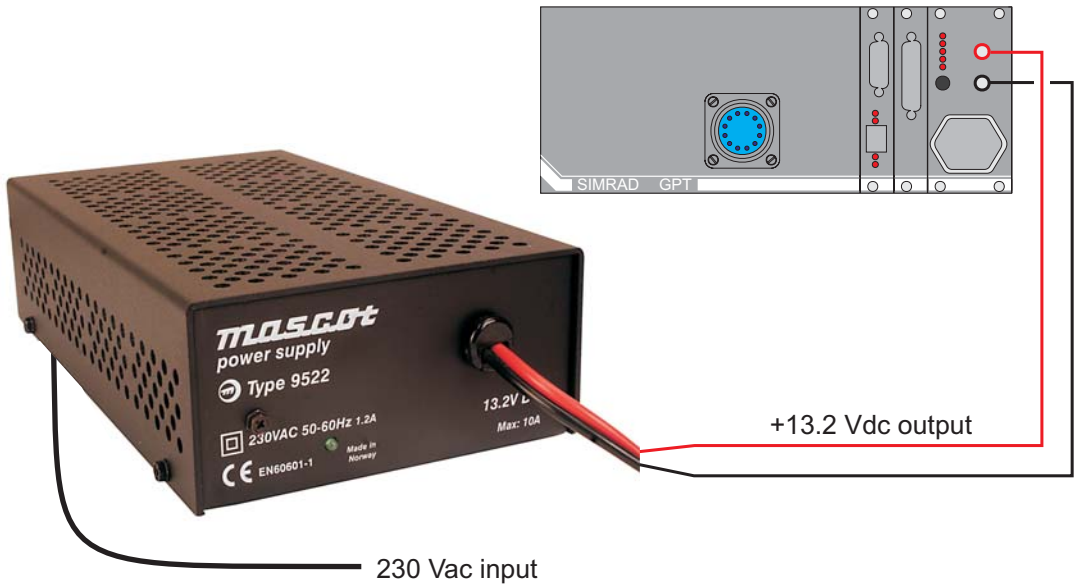
W300 Rev.B	Commercial power supply

External power supply for transceiver

In order to suppress electric noise, certain echo sounder configurations require an external power supply. This power supply is the used instead of the 230 Vac power cable.

Note

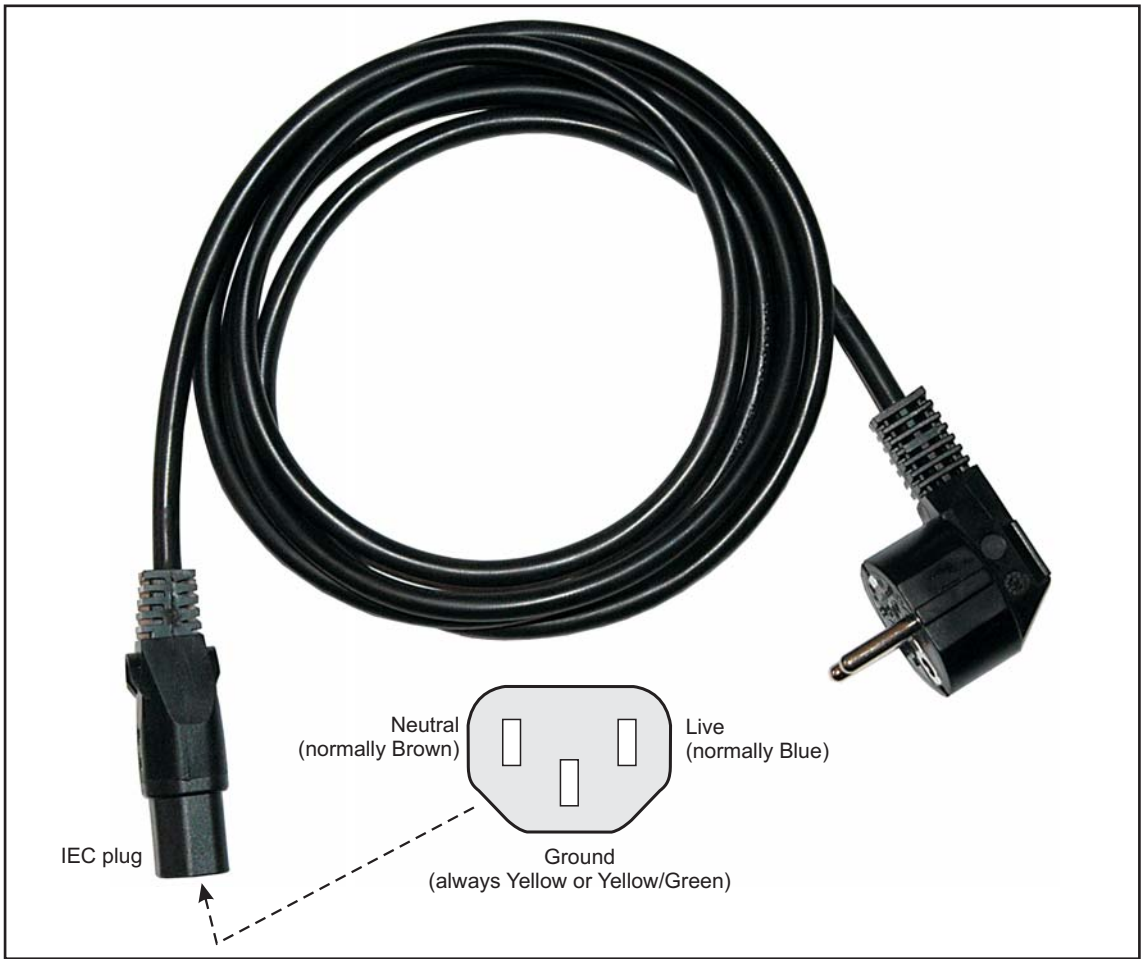
The external power supply is not required for transceivers operating on 115 Vac.



W319 Rev.A	External power supply for General Purpose Transceiver

230 Vac power cable

This is a commercial 230 Vac power cable for 2-phase power. One end is fitted with an IEC plug, the other with a standard European mains plug. This is a standard cable type supplied in different lengths.

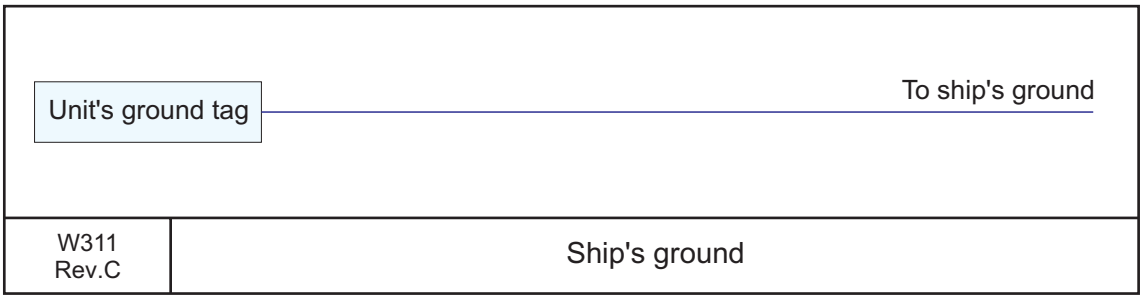


W320 Rev.B	Commercial power cable for 230 Vac 2-phase

- Conductors: Defined by the manufacturer
- Screen: None
- Voltage: Defined by the manufacturer
- Maximum diameter: Defined by the manufacturer

Ship’s ground

This cable is used to connect a system unit to the ship’s ground. Note that this cable must be as short as possible.

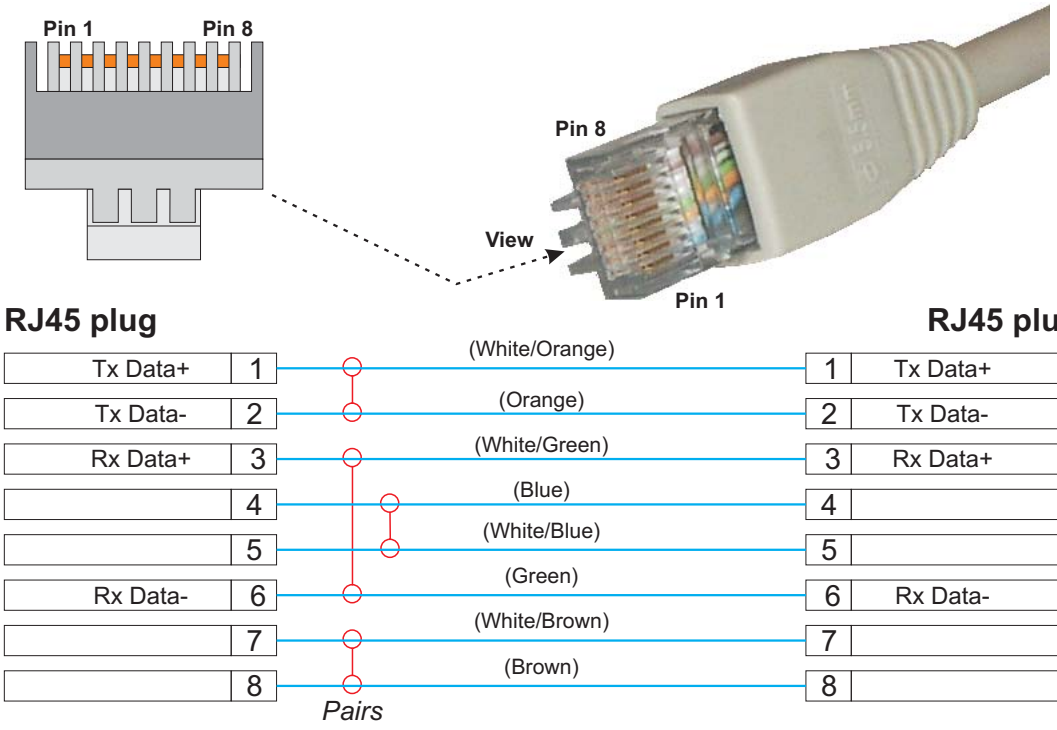


- Conductors: 1 x 6 mm2
- Screen: None
- Voltage: 60 V
- Maximum diameter: N/A

Ethernet cable with RJ45, “straight”

This cable is used to provide standard ethernet connections. Note that various categories exists. **Cat.5** and **Cat.6** cables are used in local area networks with bandwidth exceeding 100 Mbit

Ethernet cables are available commercially in different lengths, colours and categories.



W403 Rev.B	Ethernet 10Base-T “Straight Through”

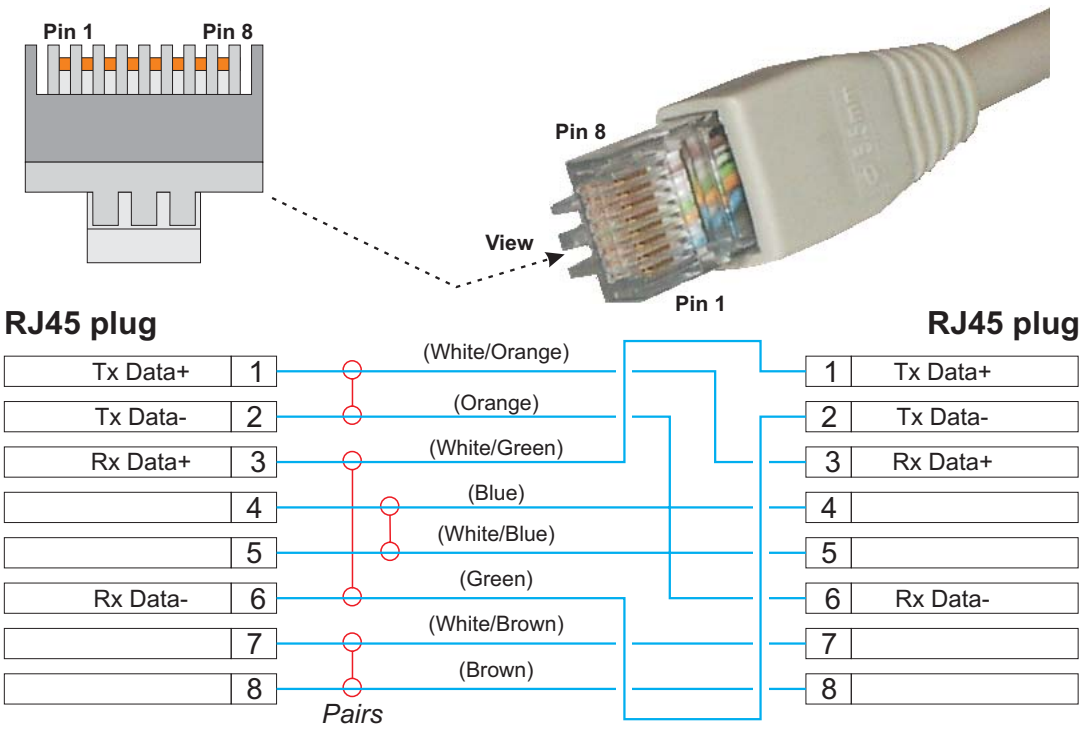
In order to prevent noise and crosstalk, you are strongly advised to use the cable pairs indicated in the drawing.

- Conductors: Defined by the manufacturer
- Screen: Overall screened
- Voltage: Defined by the manufacturer
- Maximum diameter: Defined by the manufacturer
- Termination: RJ45 in each end

Ethernet cable with RJ45, “crossover”

This cable is used to provide standard ethernet connections. Note that various categories exists. **Cat.5** and **Cat.6** cables are used in local area networks with bandwidth exceeding 100 Mbit

Ethernet cables are available commercially in different lengths, colours and categories.



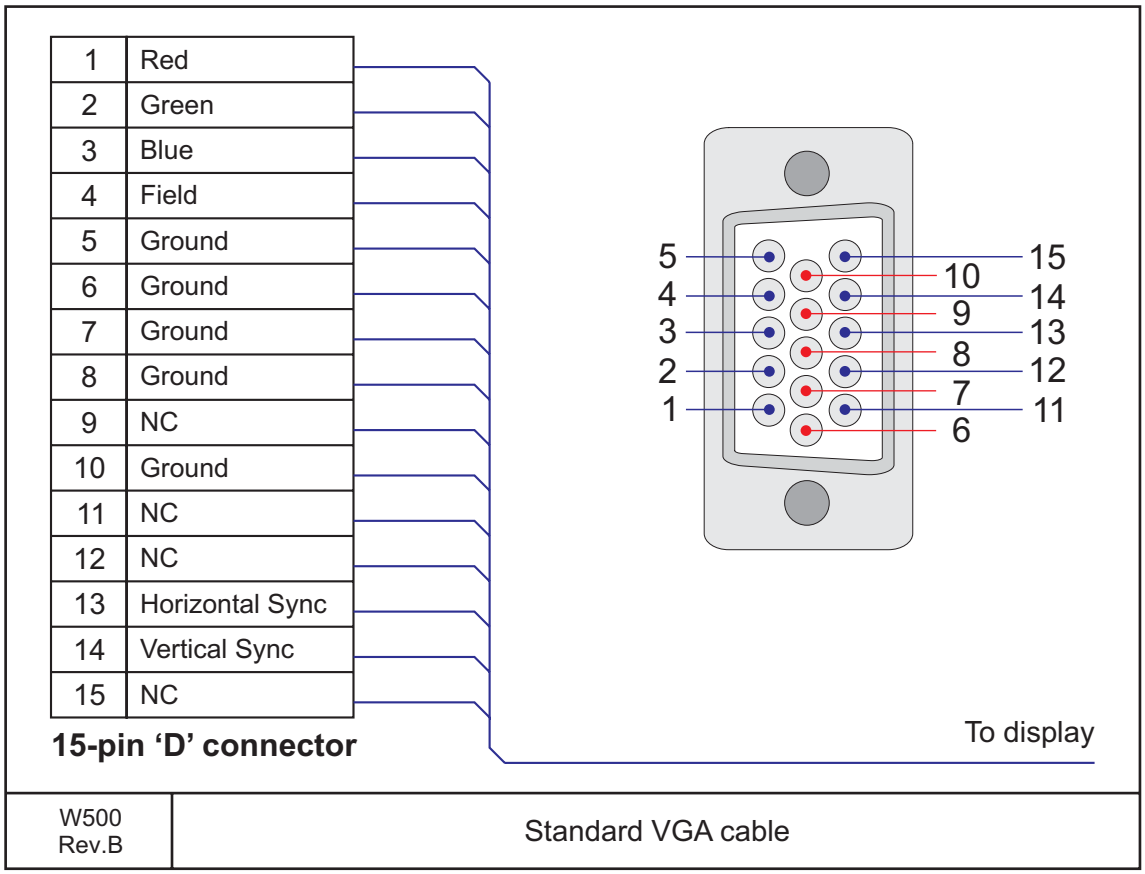
W405 Rev.A	Ethernet 10Base-T “Crossover”

In order to prevent noise and crosstalk, you are strongly advised to use the cable pairs indicated in the drawing.

- Conductors: Defined by the manufacturer
- Screen: Overall screened
- Voltage: Defined by the manufacturer
- Maximum diameter: Defined by the manufacturer
- Termination: RJ45 in each end

VGA / SVGA Display cable

This is a standard commercial SVGA/VGA display cable used to connect the video signals. The cable is normally physically attached to the display monitor, and it is provided with the plug readily attached. If it is supplied as a separate cable, it is fitted with plugs on either end.



- Conductors: Defined by the manufacturer
- Screen: Defined by the manufacturer
- Voltage: Defined by the manufacturer
- Maximum diameter: Defined by the manufacturer
- Termination: Normally 15–pin D-connector(s)

USB cable

Just about any computer that you buy today comes with one or more Universal Serial Bus (USB) connectors on the back. These connectors let you attach everything from mice to printers to your computer quickly and easily. Since the operating system supports USB, installation of device drivers is also easy.

In most cases, the USB cable is commercial, and they are normally supplied with the external devices, However, USB cables are also available commercially in different fixed lengths.

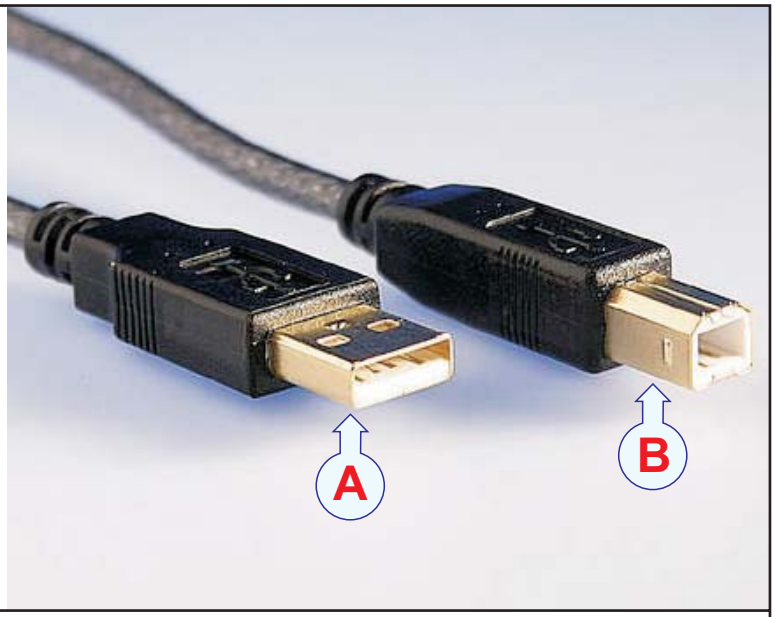
Universal Serial Bus (USB) cable terminated with an **A-plug** in one end and a **B-plug** in the other.

Internal cables:

Pair 1:
28 AWG twisted pair (data, green, white)

Pair 2:
20 AWG twisted pair (Power, red, black)

Shield:
Foil and braid

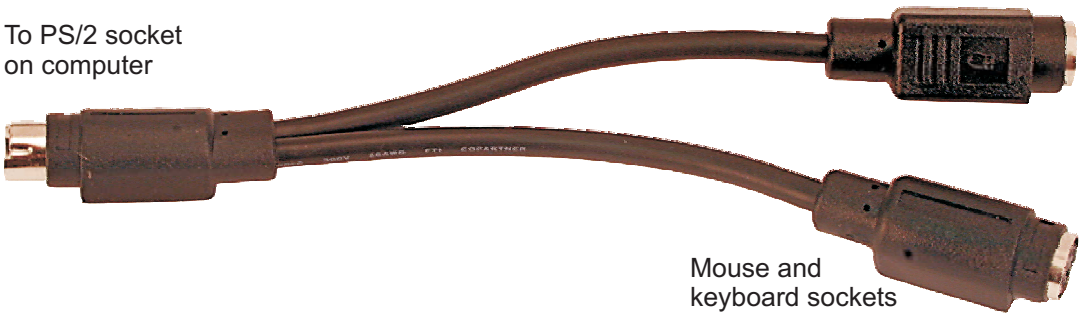


W501 Rev.B	Commercial USB cable

A standard 4,5 m USB cable can be provided by xx. Order number is 719-078524.

PS/2 Adapter for mouse and keyboard

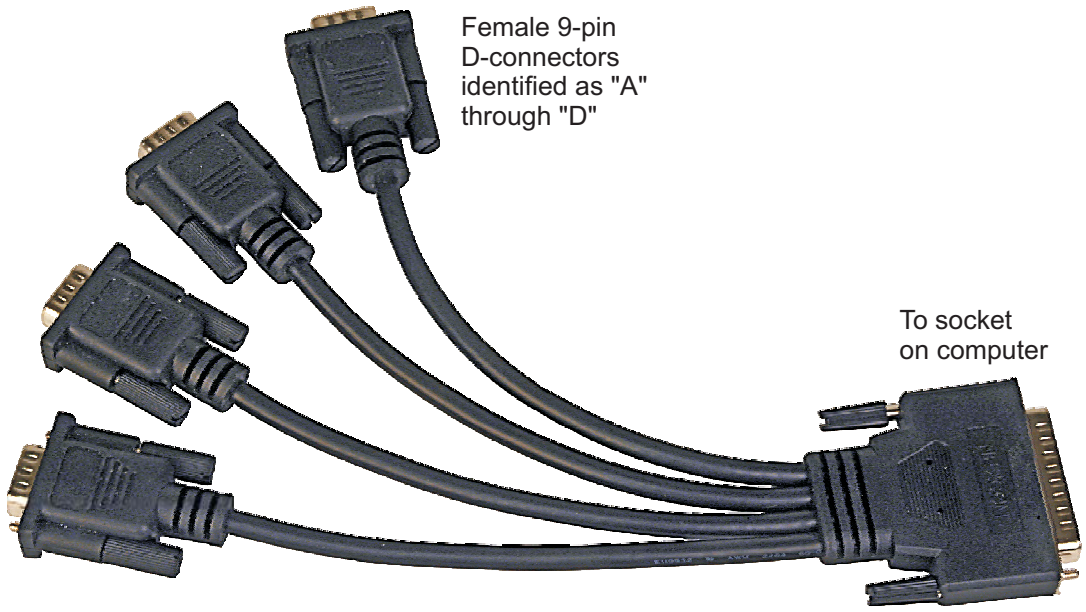
This is a commercial adapter. It allows you to connect a standard mouse (or other pointing device) and a keyboard simultanously into a PS/2 socket on a computer. The two sockets are marked with keyboard and mouse symbols to ensure correct connections.



W509 Rev.A	PS/2 adapter for keyboard and mouse

Serial line adapter

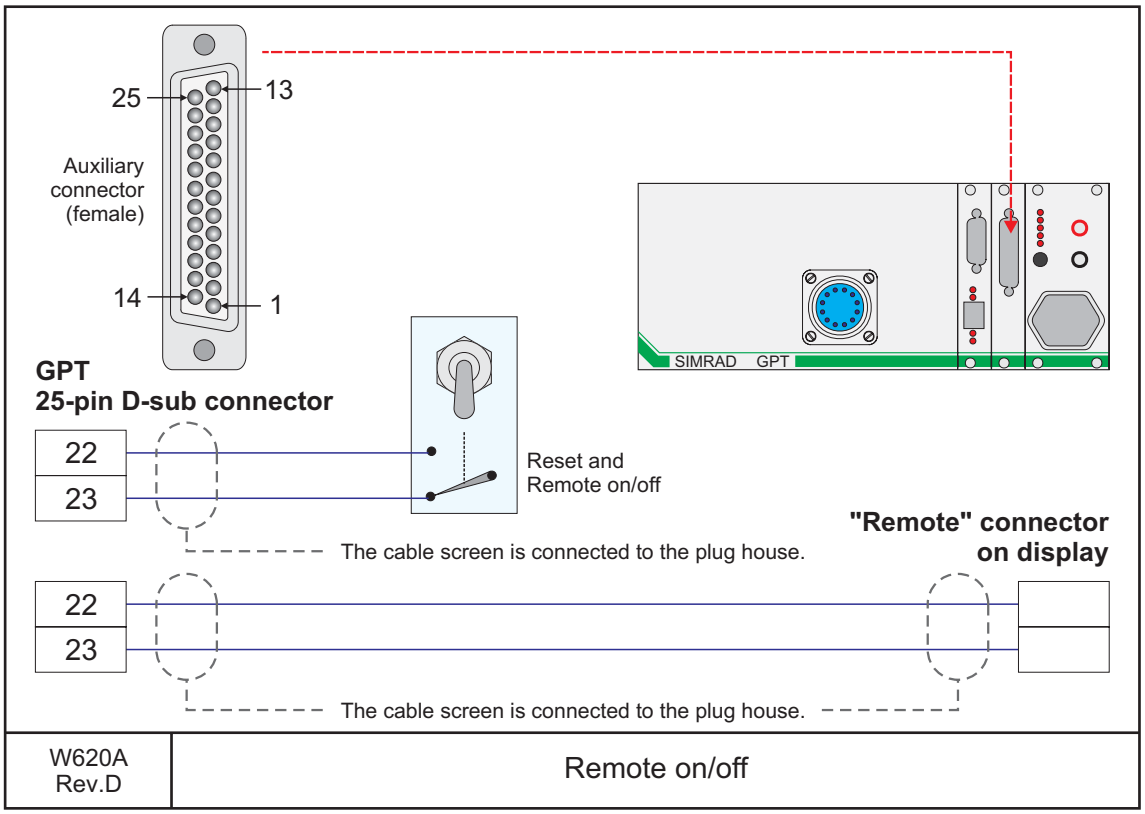
This is a commercial adapter. It allows you to connect four RS-232 serial lines to a common socket on the computer.



W510 Rev.A	Serial line adapter

GPT remote on/off

This cable is used to connect a remote on/off switch to the General Purpose Transceiver (GPT). The switch can be located in a separate box manufactured by the installation shipyard, or incorporated on a common switch panel.

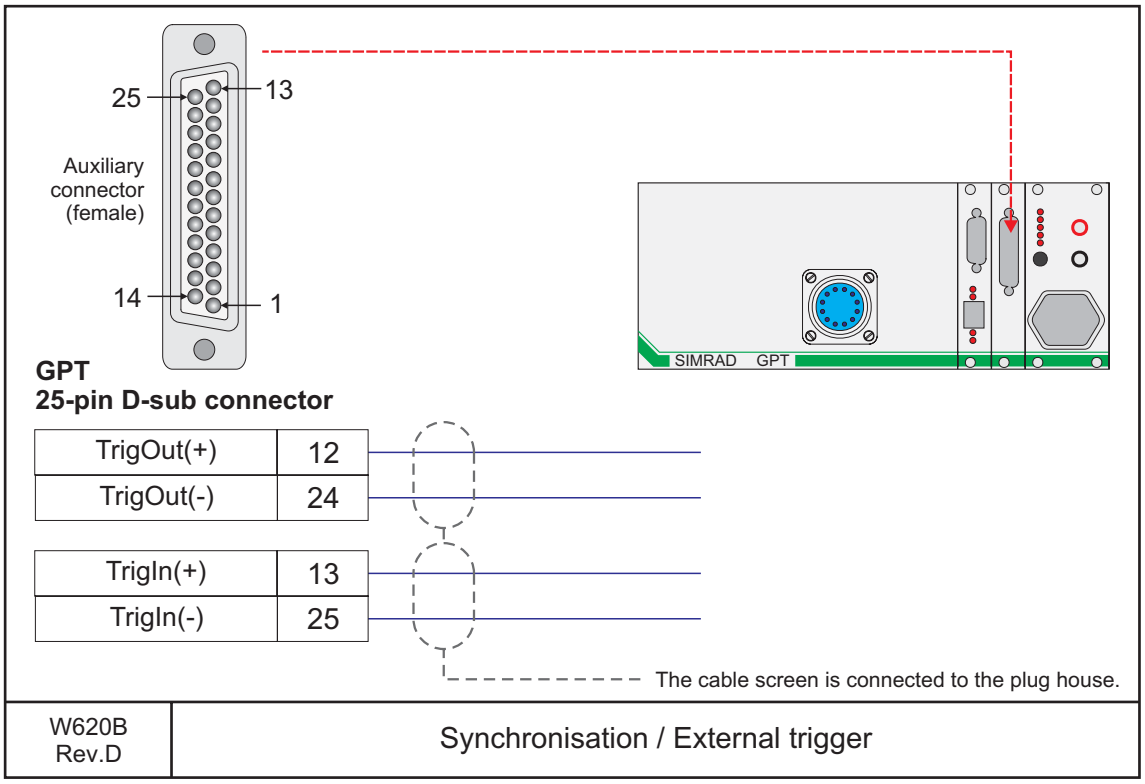


W620A Rev.D	Remote on/off

- Conductors: 2 x .22 mm2
- Screen: Overall braided
- Voltage: 60 V
- Maximum diameter: Defined by the plugs

GPT trigger / synchronisation

This cable is used to connect the General Purpose Transceiver (GPT) to an external system for synchronisation purposes. It connects to the 25–pin D-sub connector on the front side of the GPT.

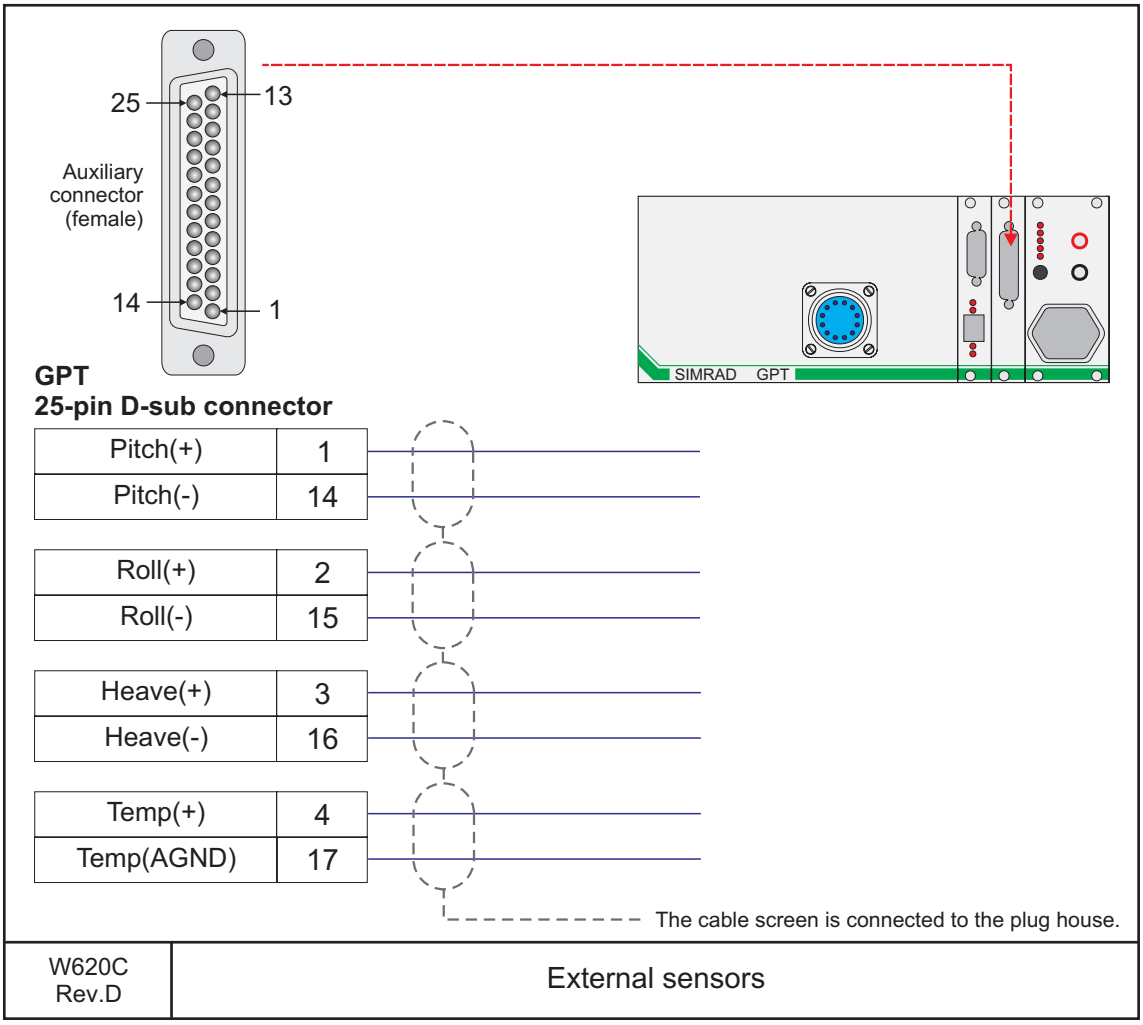


W620B Rev.D	Synchronisation / External trigger

- Conductors: 2 x 2 x 0.22 mm2
- Screen: Braided pairs and overall braided
- Voltage: 60 V
- Maximum diameter: Defined by the plugs

GPT external sensors

This cable is used to connect the General Purpose Transceiver (GPT) to external motion and temperature sensors. It connects to the 25–pin D-sub connector on the front side of the GPT.

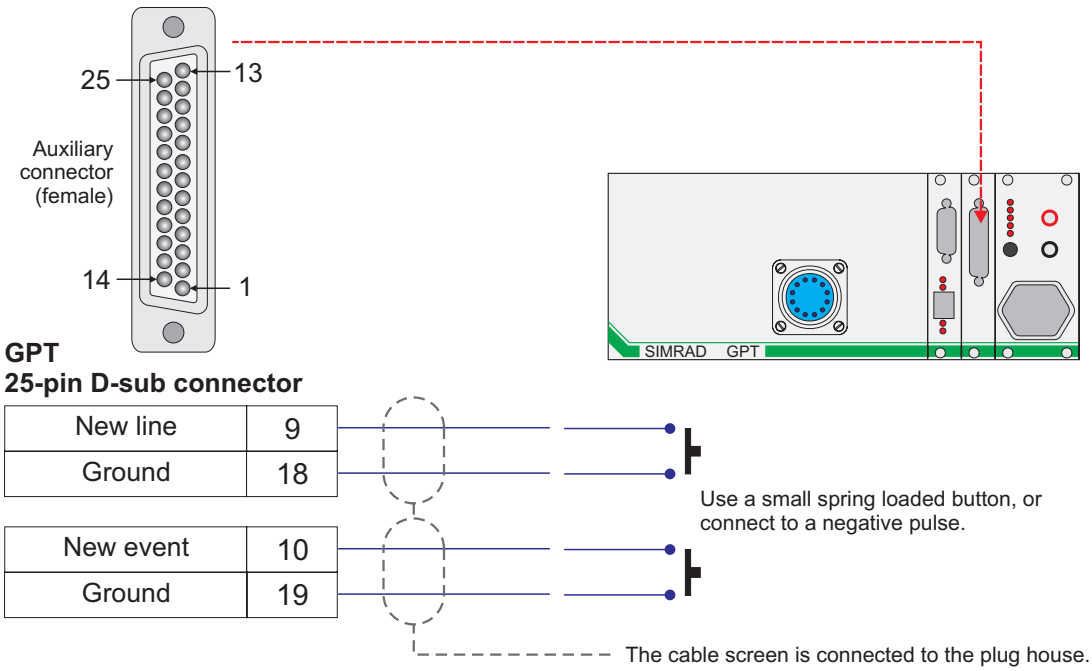


W620C Rev.D	External sensors

- Conductors: 2 x 0.22 mm2
- Screen: Overall braided
- Voltage: 60 V
- Maximum diameter: Defined by the plugs

GPT Event and New line

This cable is used to connect the General Purpose Transceiver (GPT) to external buttons for “Event” and “New line number” generation. Both cables connect to the 25–pin D-sub connector on the front side of the GPT.

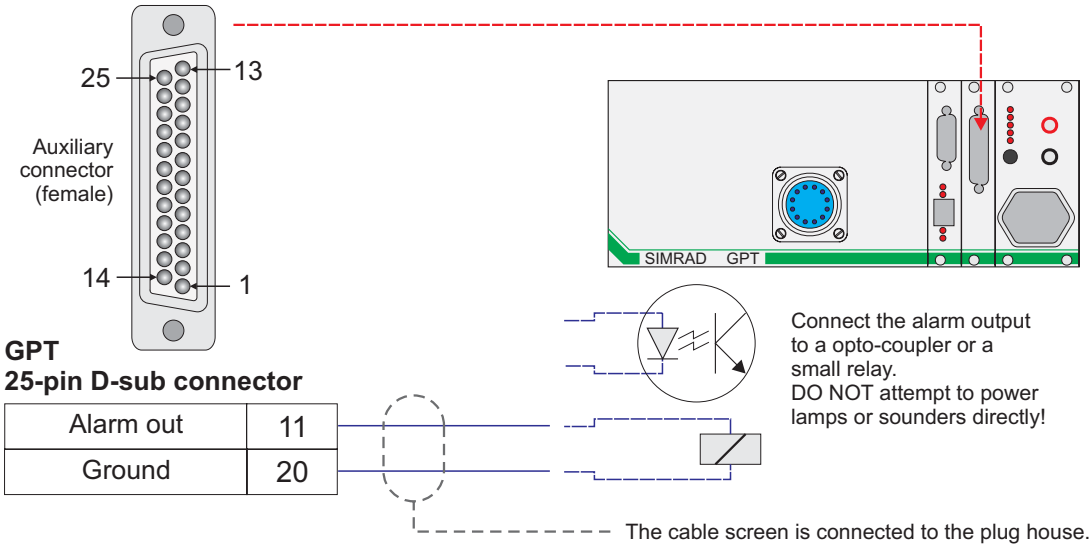


W620D Rev.D	"Event" and "New line" buttons

- Conductors: 2 x 0.22 mm2
- Screen: Overall braided
- Voltage: 60 V
- Maximum diameter: Defined by the plugs

GPT Alarm output

This cable is used to connect the General Purpose Transceiver (GPT) to an external device for audible and/or visual alarms. The cable connects to the 25–pin D-sub connector on the front side of the GPT.

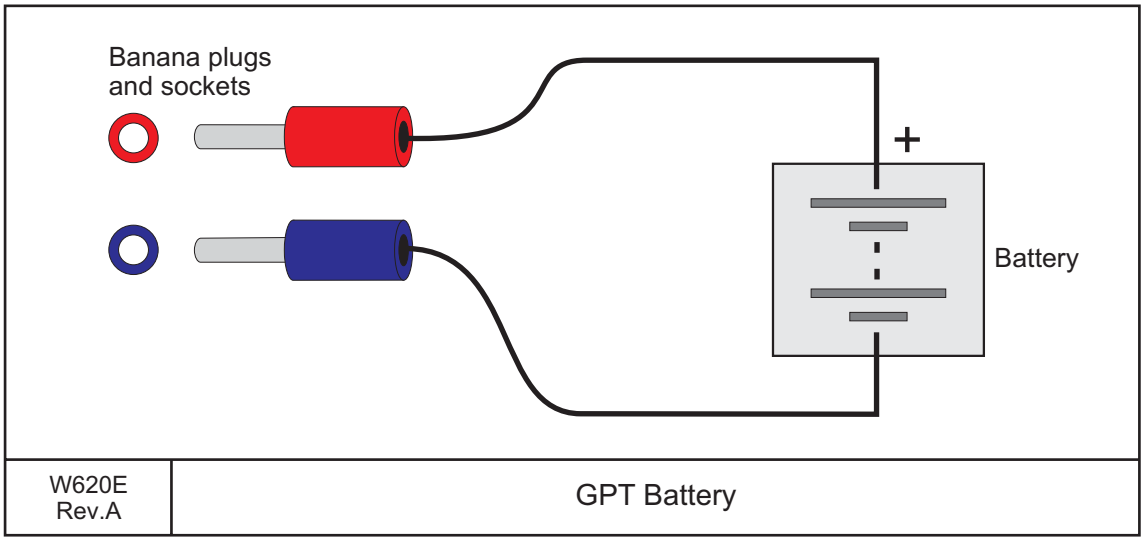


W620J Rev.A	Alarm output

- Conductors: 2 x 0.22 mm2
- Screen: Overall braided
- Voltage: 60 V
- Maximum diameter: Defined by the plugs

GPT battery

This cable is used to connect a battery to the General Purpose Transceiver (GPT). Red plug and red socket is normally used for positive (+). Black plug and black socket is normally used for negative (-).

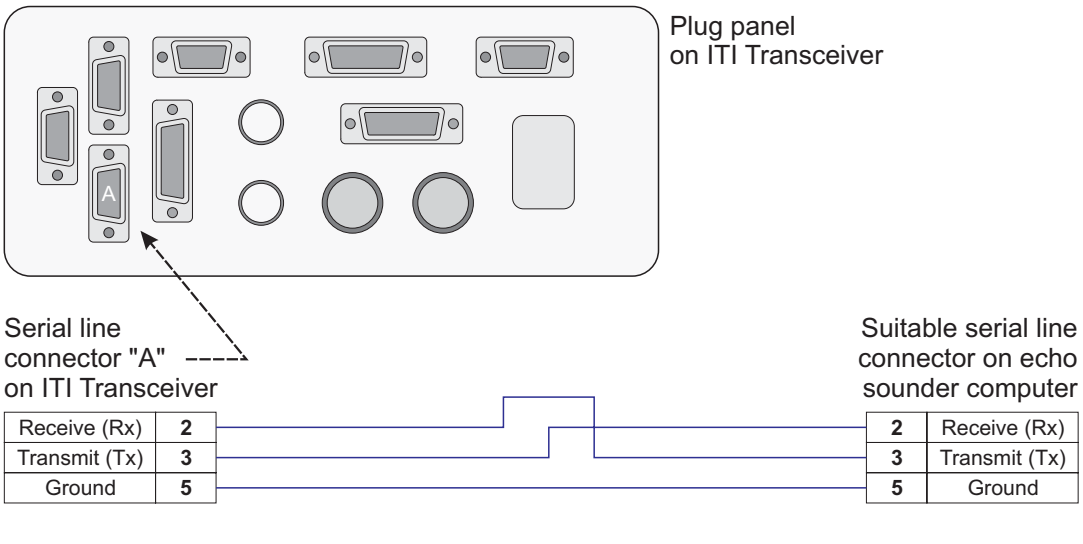


W620E Rev.A	GPT Battery

- Conductors: 2 x 1.5 mm2
- Screen: N/A
- Voltage: Select to fit battery voltage
- Maximum diameter: N/A

Cable between ITI and echo sounder

This cable is used to provide a two-way communication between the echo sounder and a ITI Trawl system.

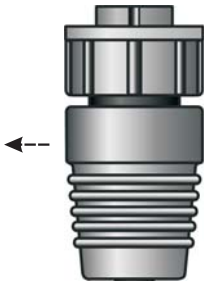


W620F Rev.A	Communication between ITI and echo sounder

- Conductors: 9 x 2 x 0.5 mm2
- Screen: Screened twisted pairs and overall braided
- Voltage: 60 V
- Maximum diameter: Limited by the plugs

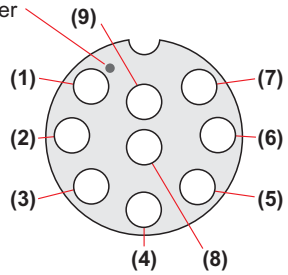
Cable between PI44/54 and echo sounder

This cable is used to provide a two-way communication between the echo sounder and a PI44 or PI54 catch monitoring system.



A small circular marker identifies pin 1.

View:
Looking into the socket on the rear side of the cabinet = Wiring view of cable side on male and female plugs.



NMEA connector on PI system

Plug and connector manufacturer: www.conxall.com

Colours below are those used on the serial line cable provided with the PI system.

Not used	1
Not used	2
Not used	3
Not used	4
Not used	5
Tx - Data out	6
Tx - Ground	7
Rx - Data in	8
Rx - Ground	9

White
Brown
Yellow
Green

Suitable serial line connector on echo sounder computer

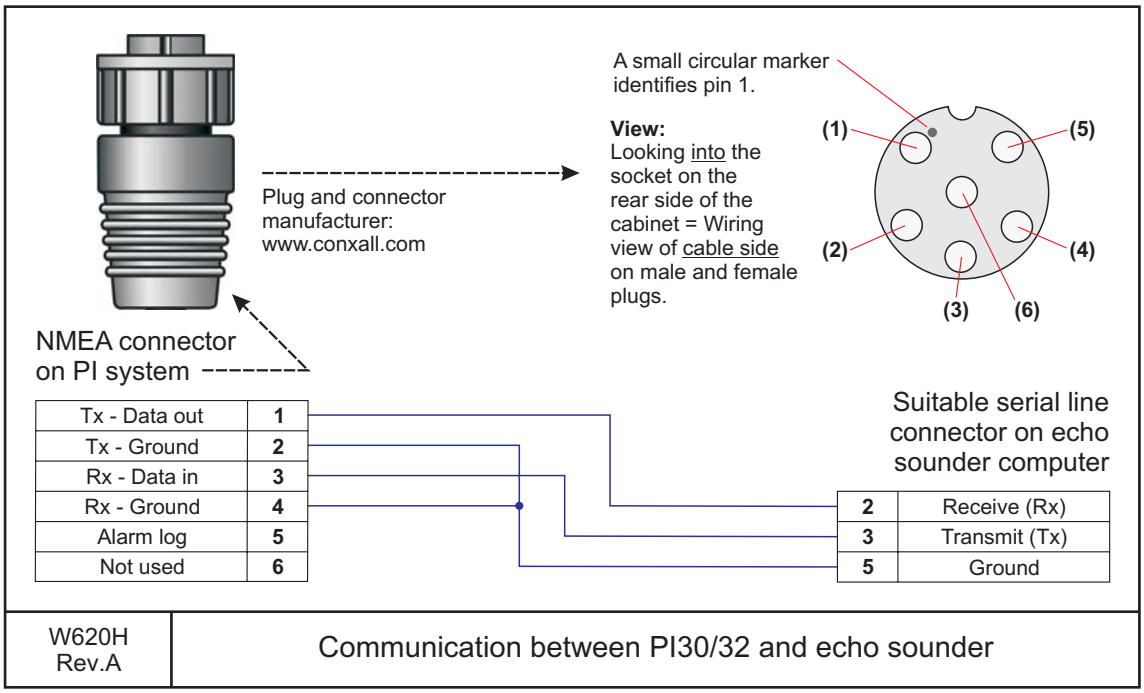
2	Receive (Rx)
3	Transmit (Tx)
5	Ground

W620G Rev.A	Communication between PI44/54 and echo sounder

- Conductors: 9 x 2 x 0.5 mm2
- Screen: Screened twisted pairs and overall braided
- Voltage: 60 V
- Maximum diameter: Limited by the plugs

Cable between PI30/32 and echo sounder

This cable is used to provide a two-way communication between the echo sounder and a PI30 or PI32 catch monitoring system.

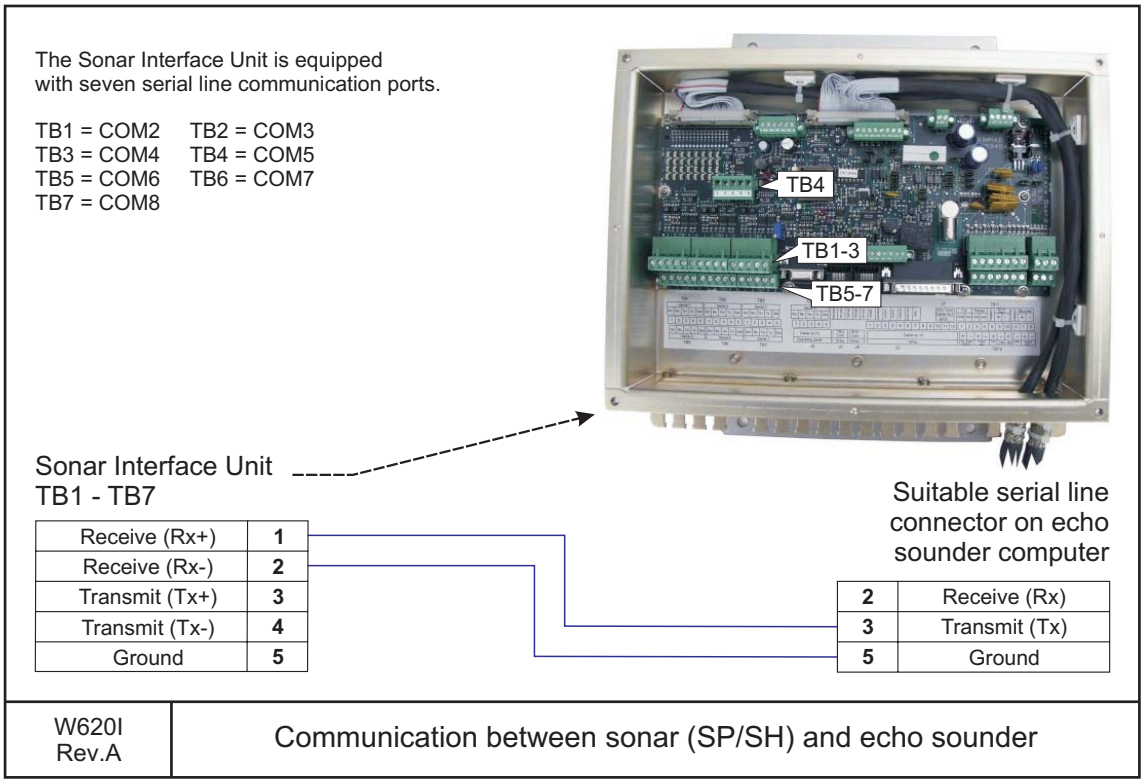


W620H Rev.A	Communication between PI30/32 and echo sounder

- Conductors: 9 x 2 x 0.5 mm2
- Screen: Screened twisted pairs and overall braided
- Voltage: 60 V
- Maximum diameter: Limited by the plugs

Cable between SH/SP sonar and echo sounder

This cable is used to provide a two-way communication between the echo sounder and a SP60, SP70, SP90, SH40 or SH80 sonar system.



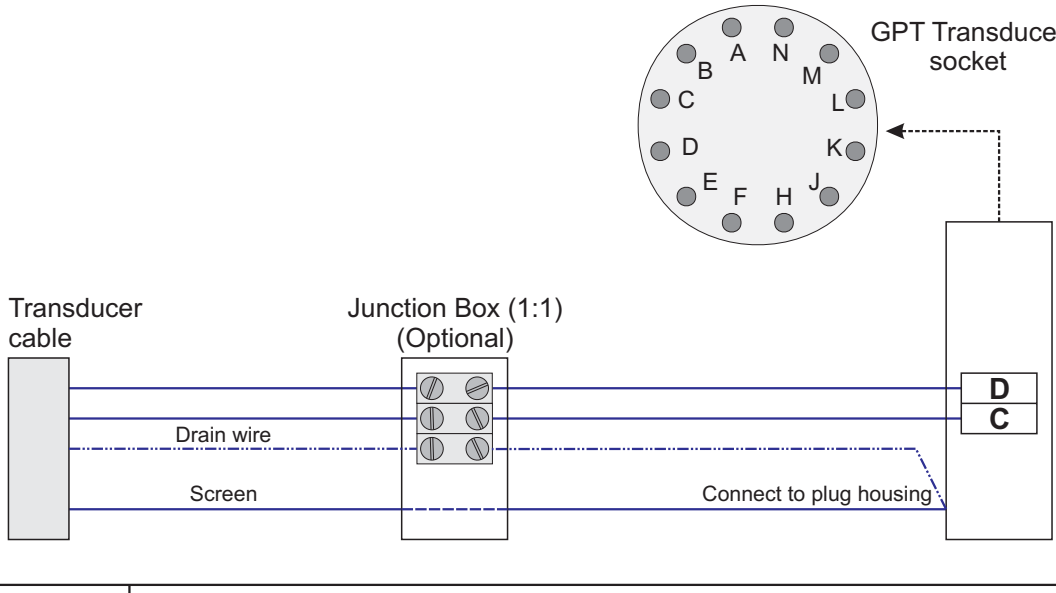
W620I Rev.A	Communication between sonar (SP/SH) and echo sounder

- Conductors: 9 x 2 x 0.5 mm2
- Screen: Screened twisted pairs and overall braided
- Voltage: 60 V
- Maximum diameter: Limited by the plugs

Single beam, normal power transducer

This is the termination of the transducer cable from a single frequency, single beam transducer to the transducer socket on the General Purpose Transceiver Unit (GPT). The other end of the cable is permanently fixed to the transducer.

Normal power output (1 kW) is achieved when the GPT is equipped with a single transmitter board.



W802-1 Rev.E	Single frequency, single beam, normal power termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

Cable splicing on page 140

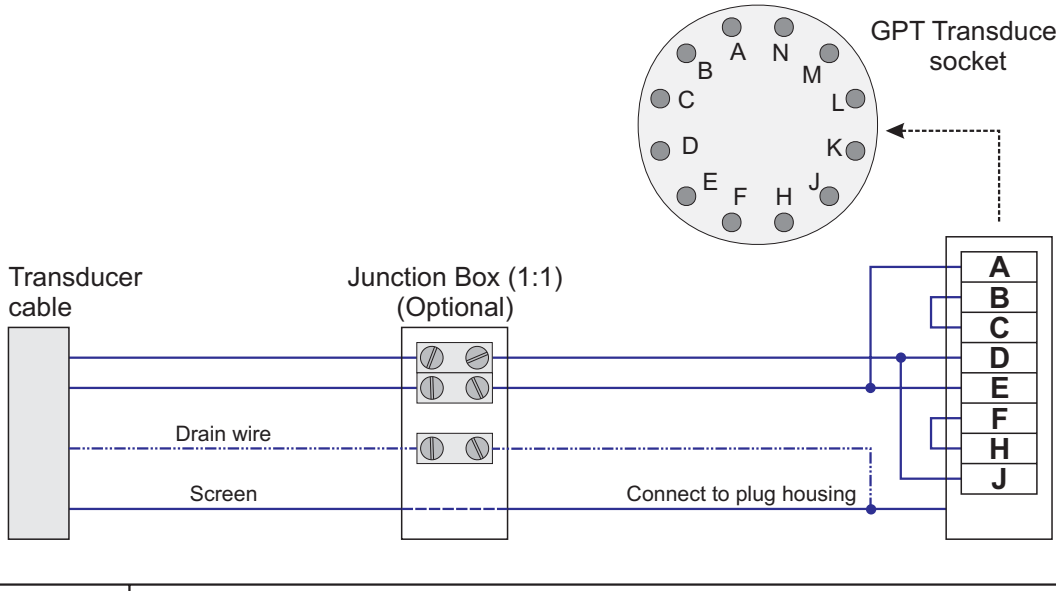
Steel conduit on page 140

GPT Transducer plug connection on page 105

Single beam, high power transducer

This is the termination of the transducer cable from a single frequency, single beam transducer to the transducer socket on the General Purpose Transceiver Unit (GPT). The other end of the cable is permanently fixed to the transducer.

High power output (more than 1 kW) is achieved when the GPT is equipped with four transmitter boards



W802-2 Rev.E	Single frequency, single beam, high power termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

Cable splicing on page 140

Steel conduit on page 140

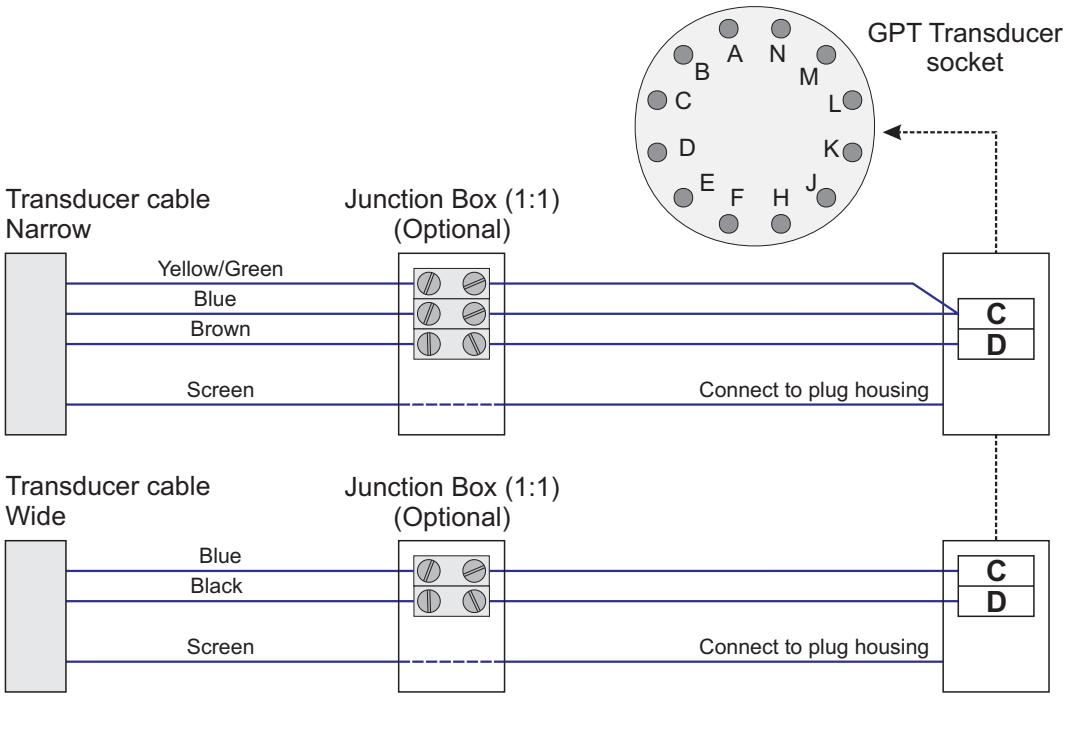
GPT Transducer plug connection on page 105

Dual beam (wide or narrow) transducer

This is the termination of the transducer cable from a single frequency, dual beam transducer to the transducer socket on the General Purpose Transceiver Unit (GPT). The other end of the cable is permanently fixed to the transducer.

Note

Always check the transmit power if wide beam is selected in order not to exceed the power capacity on the transducer.



W802-3 Rev.E	Single frequency, dual beam (wide or narrow) termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

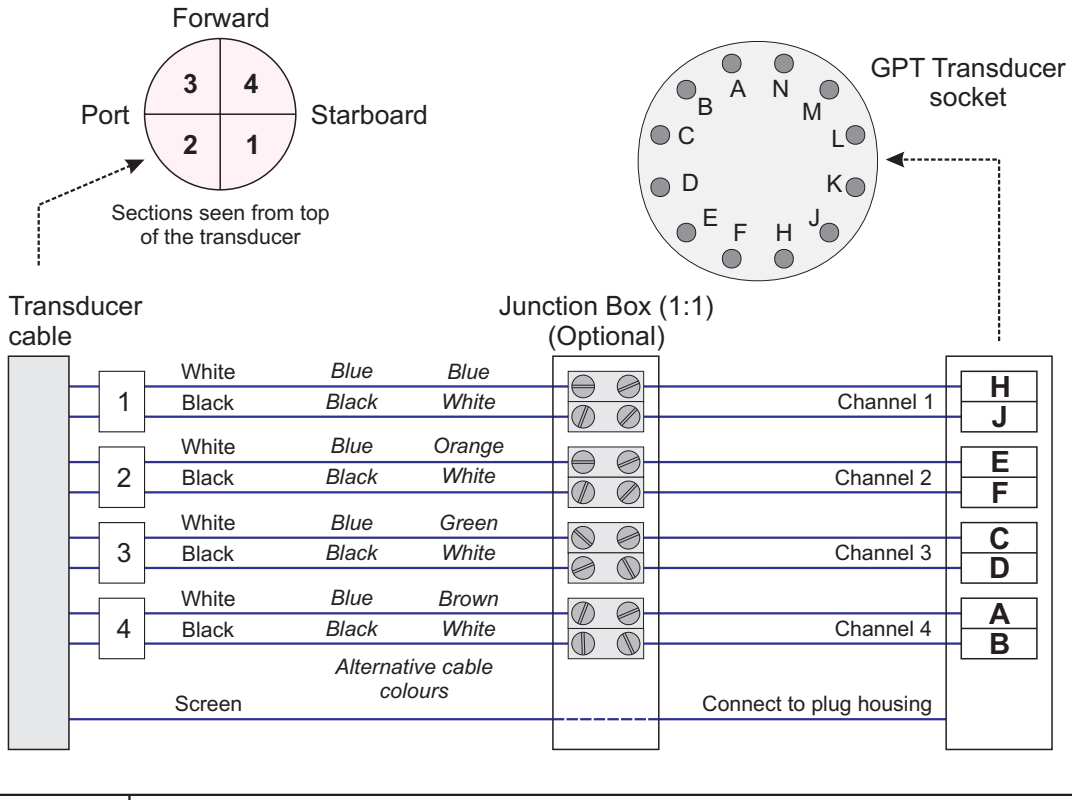
Cable splicing on page 140

Steel conduit on page 140

GPT Transducer plug connection on page 105

Split beam transducer

This is the termination of the transducer cable from a single frequency, split beam transducer to the transducer socket on the General Purpose Transceiver Unit (GPT). The other end of the cable is permanently fixed to the transducer.



W802-4 Rev.E	Single frequency, split beam termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

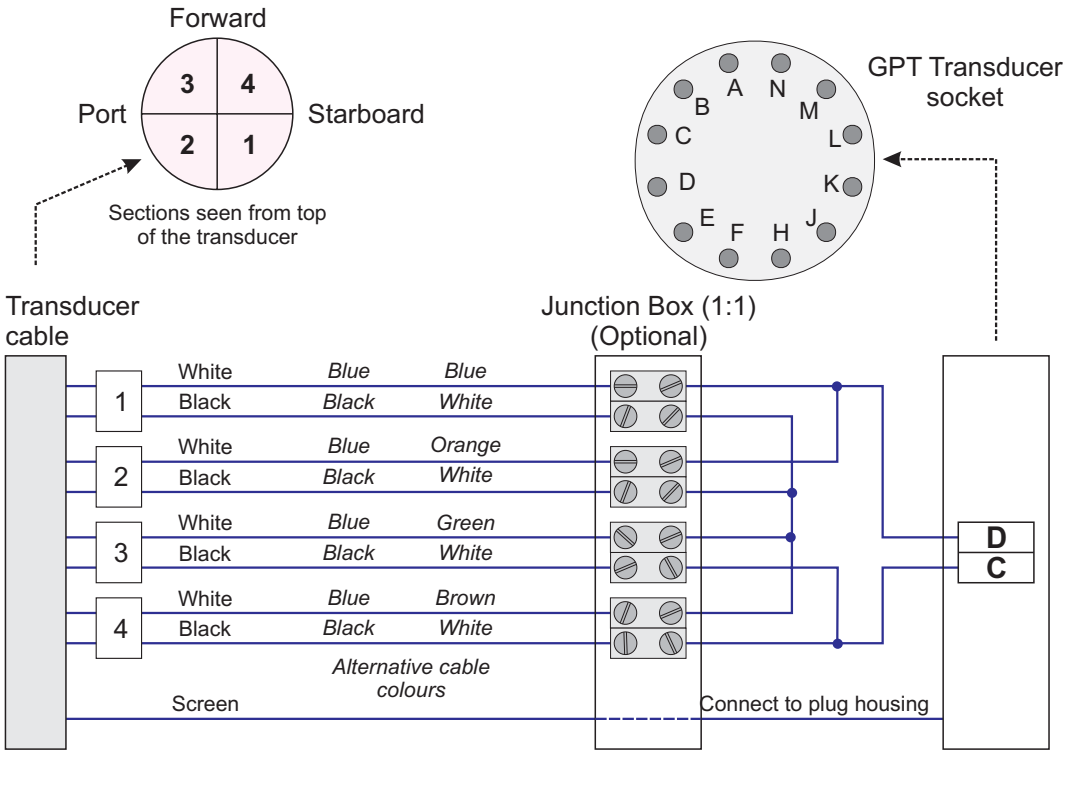
Cable splicing on page 140

Steel conduit on page 140

GPT Transducer plug connection on page 105

Split beam transducer to single beam transceiver

This is the termination of the transducer cable from a single frequency, split beam transducer - wired as a single beam transducer - to the socket on the General Purpose Transceiver Unit (GPT). The other end of the cable is permanently fixed to the transducer.



W802-5 Rev.E	Single frequency, split beam connected as single beam

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

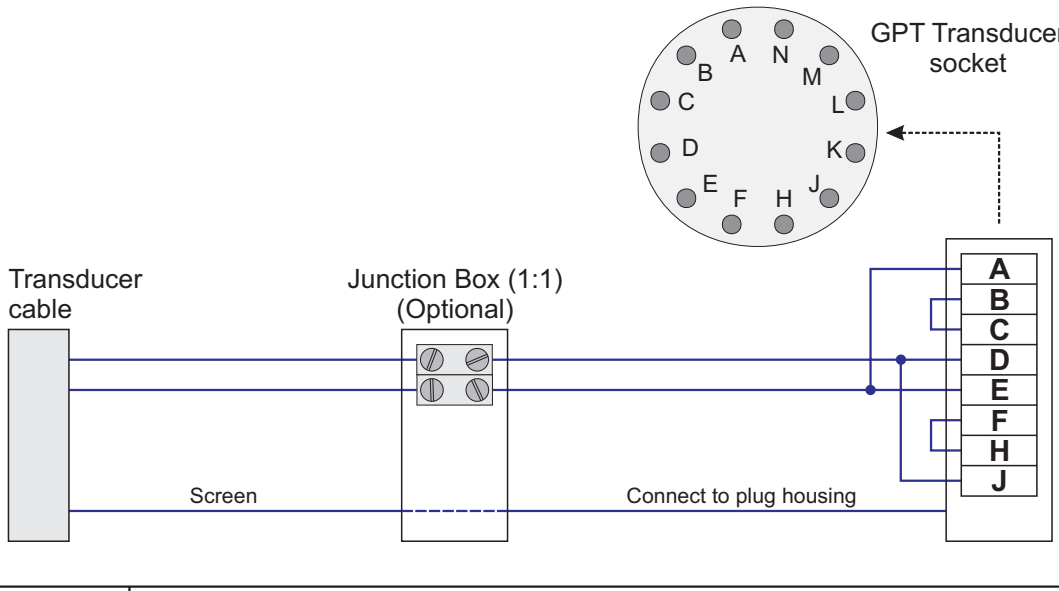
Cable splicing on page 140

Steel conduit on page 140

GPT Transducer plug connection on page 105

Single beam transducer to split beam transceiver

This is the termination of the transducer cable from a single frequency, single beam transducer to the socket on a split beam General Purpose Transceiver Unit (GPT). The other end of the cable is permanently fixed to the transducer.



W802-9 Rev.A	Single frequency, single beam, to split beam transceiver, termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

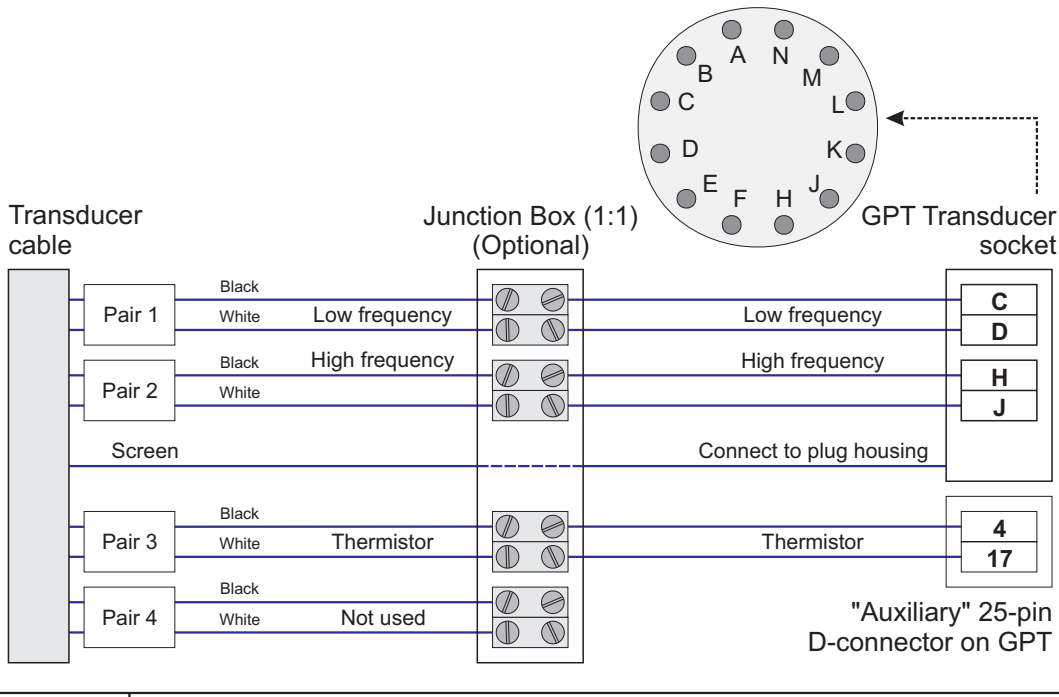
Cable splicing on page 140

Steel conduit on page 140

GPT Transducer plug connection on page 105

Dual frequency, single beam transducer

This is the termination of the transducer cable from a dual frequency, single beam transducer to the socket on the General Purpose Transceiver Unit (GPT). The other end of the cable is permanently fixed to the transducer.



W802-6 Rev.E	Dual frequency, single beam termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

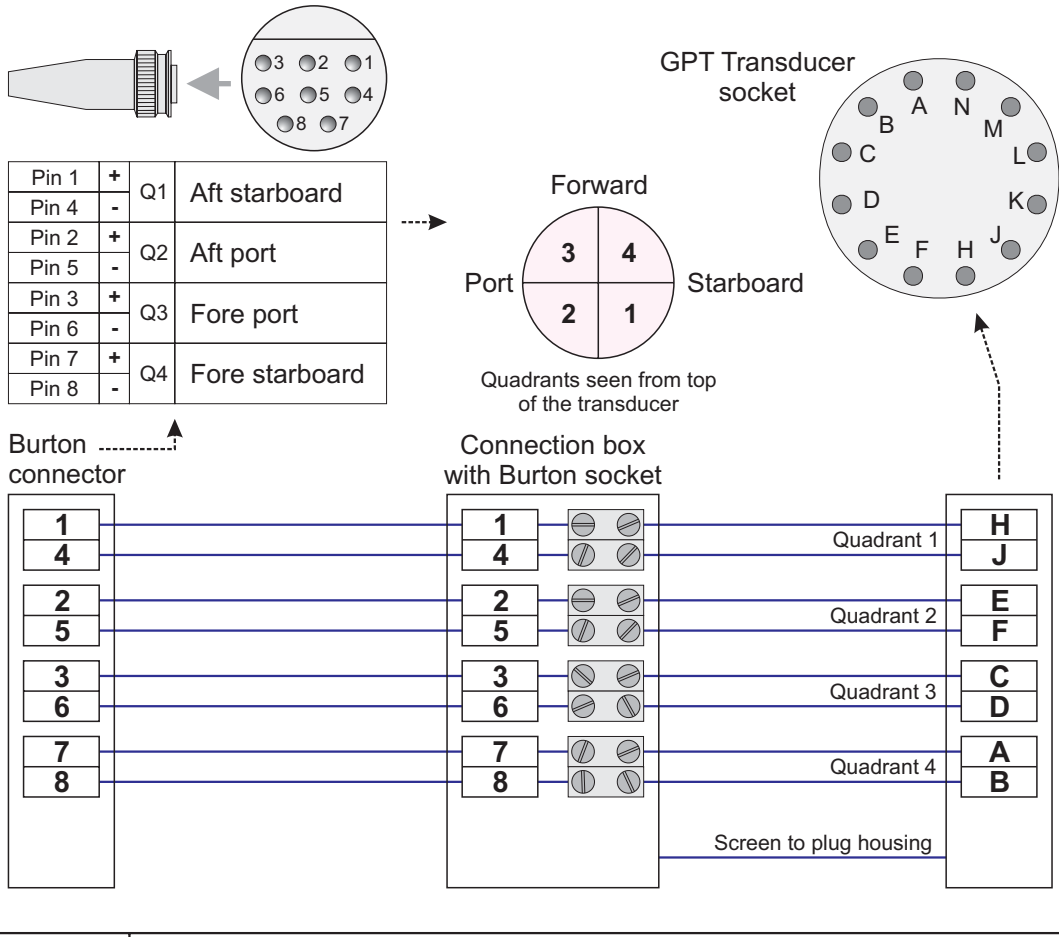
Cable splicing on page 140

Steel conduit on page 140

GPT Transducer plug connection on page 105

Deep water, split beam transducer

This is the termination of the transducer cable from a deep water transducer. This transducer is designed to be used on submergibles, for example towed arrays. The cable is equipped with a watertight connector. The other end of the cable is permanently fixed to the transducer.



W802-11 Rev.A	Deep water transducer, termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the “dry part” of the transducer cable in a steel conduit.

Related topics

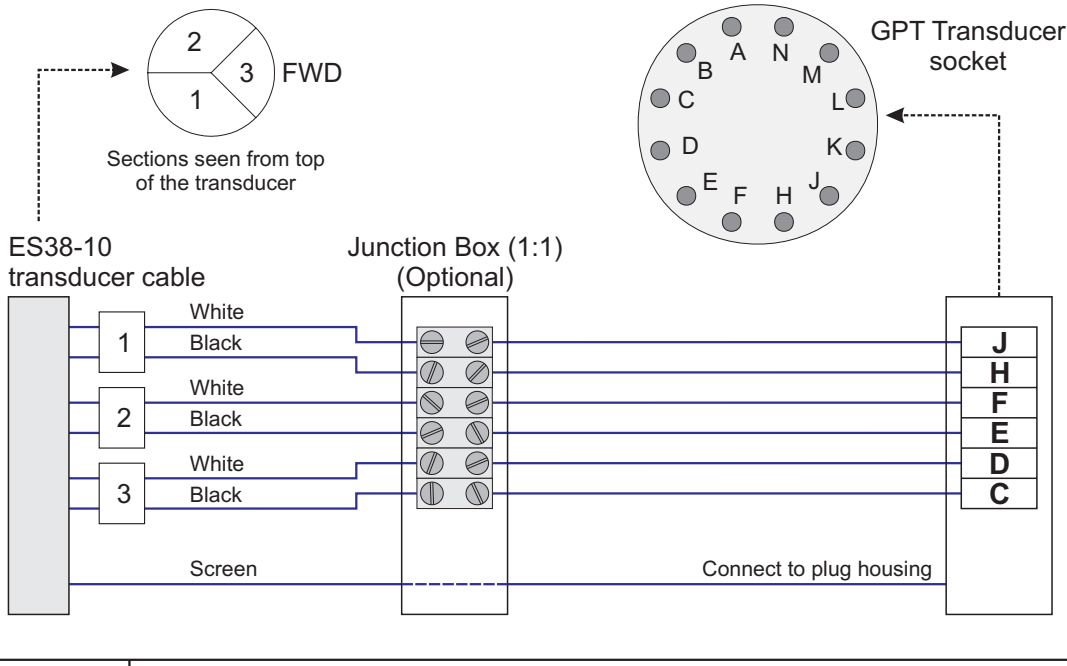
Cable splicing on page 140

Steel conduit on page 140

GPT Transducer plug connection on page 105

ES38–10 transducer

This is the termination of the transducer cable from the ES38–10 split-beam transducer to the transducer socket on the ES60 and EK60 General Purpose Transceiver Unit (GPT). The other end of the cable is permanently fixed to the transducer.



W802-8 Rev.A	ES38-10 Transducer cable termination

There are four pairs in the transducer cable, each with one black and one white cable. Each pair is marked with a small label identifying the transducer section. Pair number 4 is not used.

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

Cable splicing on page 140

Steel conduit on page 140

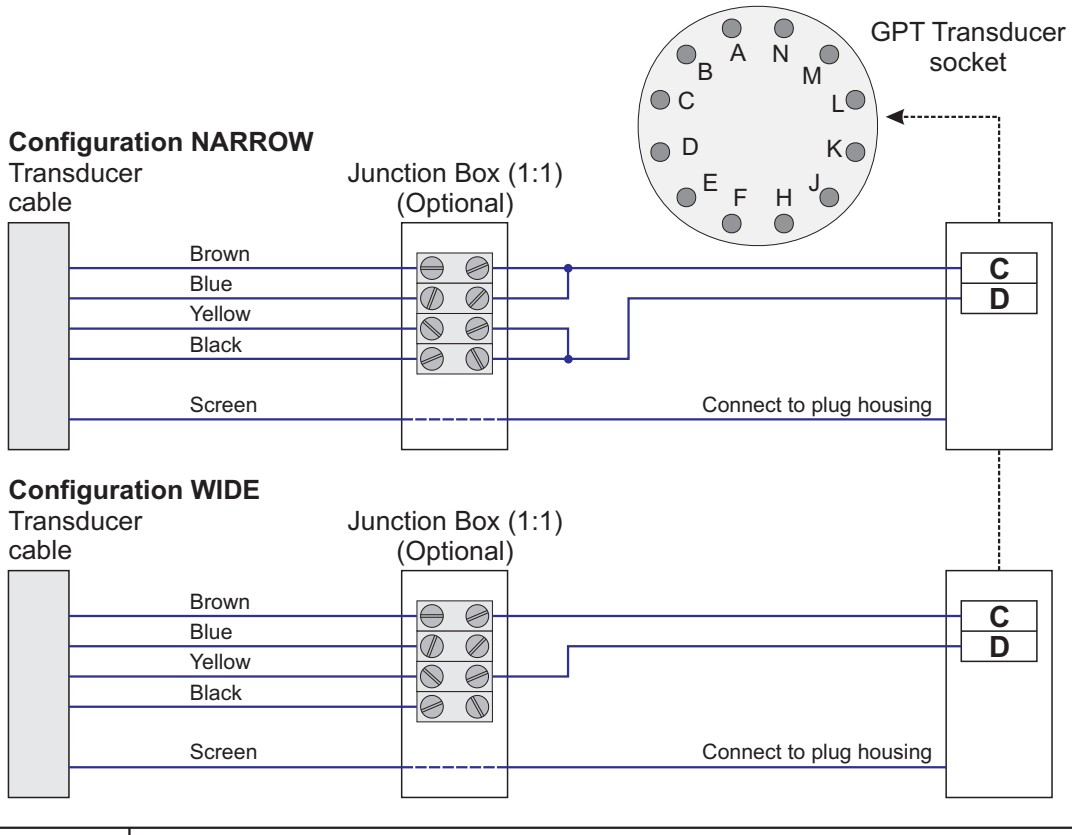
GPT Transducer plug connection on page 105

12-16/60 transducer

This is the termination of the transducer cable from the 12–16/60 single or dual beam transducer to the transducer socket on the General Purpose Transceiver Unit (GPT). The other end of the cable is permanently fixed to the transducer.

Note

Always check the transmit power if wide beam is selected in order not to exceed the power capacity on the transducer.



W802-10 Rev.A	12-16/60 Transducer cable termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

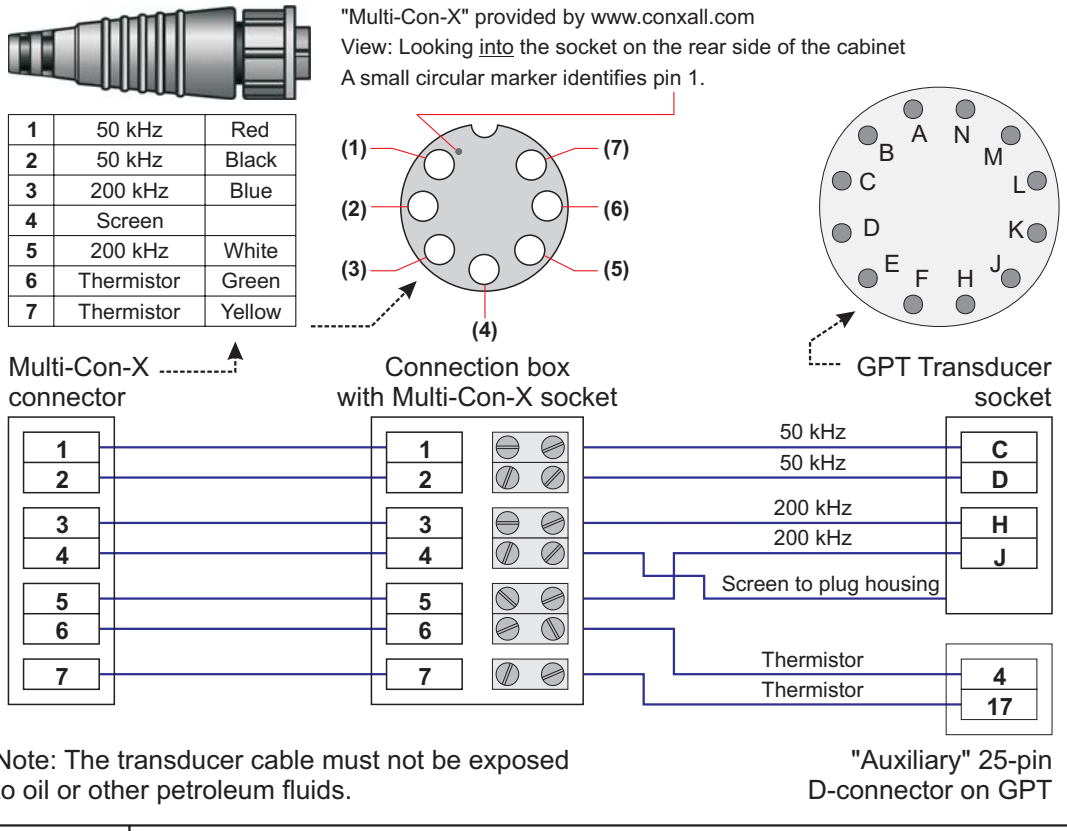
Cable splicing on page 140

Steel conduit on page 140

GPT Transducer plug connection on page 105

50/200 Combi C transducer

This is the termination of the transducer cable from the 50/200 Combi C transducer. The transducer cable is terminated in a Multi-Con-X connector manufactured by Conxall (www.conxall.com). The other end of the cable is permanently fixed to the transducer.


"Multi-Con-X" provided by www.conxall.com
View: Looking into the socket on the rear side of the cabinet
A small circular marker identifies pin 1.
1 50 kHz Red
2 50 kHz Black
3 200 kHz Blue
4 Screen
5 200 kHz White
6 Thermistor Green
7 Thermistor Yellow
(1) (2) (3) (4) (5) (6) (7)
A B C D E F H J K L M N
Multi-Con-X connector
Connection box with Multi-Con-X socket
GPT Transducer socket
50 kHz
50 kHz
200 kHz
200 kHz
Screen to plug housing
Thermistor
Thermistor
C D H J 4 17
Note: The transducer cable must not be exposed to oil or other petroleum fluids.
"Auxiliary" 25-pin D-connector on GPT

W802-12 Rev.A	50/200 Combi C transducer, termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the “dry part” of the transducer cable in a steel conduit.

Related topics

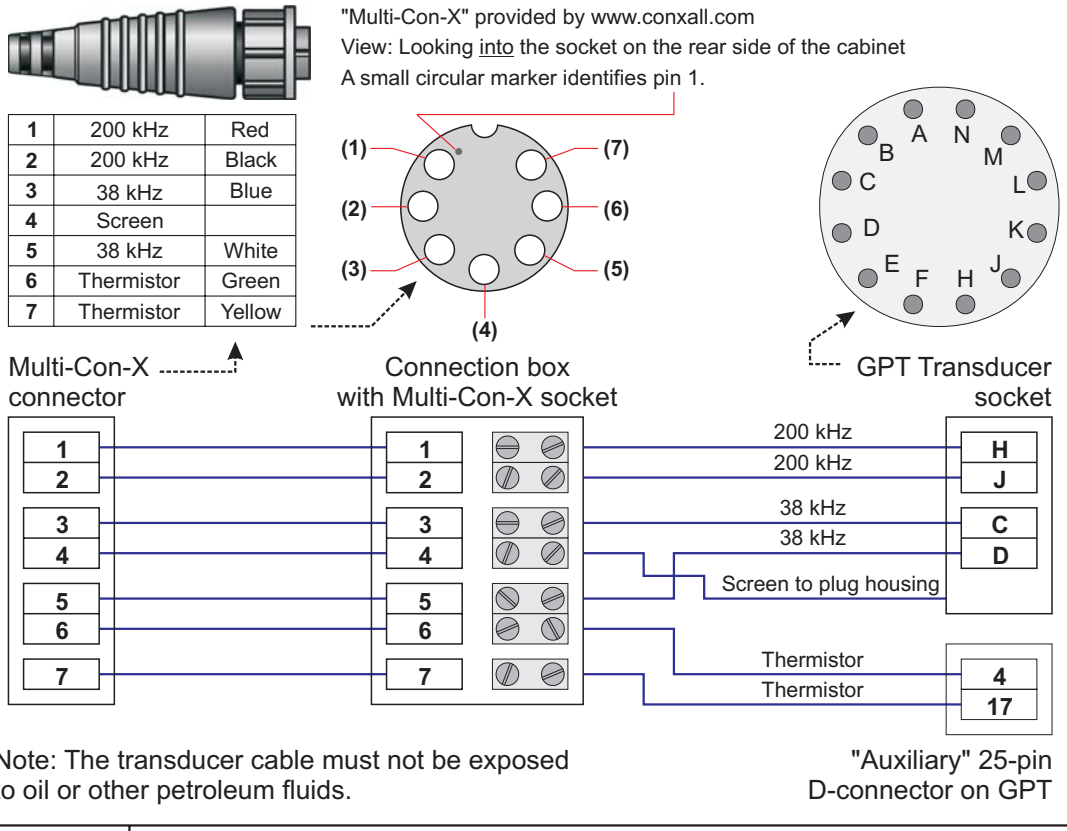
Cable splicing on page 140

Steel conduit on page 140

GPT Transducer plug connection on page 105

38/200 Combi C transducer

This is the termination of the transducer cable from the 38/200 Combi C transducer. The transducer cable is terminated in a Multi-Con-X connector manufactured by Conxall (www.conxall.com). The other end of the cable is permanently fixed to the transducer.


"Multi-Con-X" provided by www.conxall.com
View: Looking into the socket on the rear side of the cabinet
A small circular marker identifies pin 1.
1 200 kHz Red
2 200 kHz Black
3 38 kHz Blue
4 Screen
5 38 kHz White
6 Thermistor Green
7 Thermistor Yellow
(1) (2) (3) (4) (5) (6) (7)
A B C D E F H J K L M N
Multi-Con-X connector
Connection box with Multi-Con-X socket
GPT Transducer socket
200 kHz
200 kHz
38 kHz
38 kHz
Screen to plug housing
Thermistor
Thermistor
H J C D 4 17
Note: The transducer cable must not be exposed to oil or other petroleum fluids.
"Auxiliary" 25-pin D-connector on GPT

W802-13 Rev.A	38/200 Combi C transducer, termination

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the “dry part” of the transducer cable in a steel conduit.

Related topics

Cable splicing on page 140

Steel conduit on page 140

GPT Transducer plug connection on page 105

Basic cable requirements

This section provides general information related to the installation of system cables.

Cable trays

All permanently installed cables associated with the system must be supported and protected along their entire lengths using conduits and/or cable trays. The only exception to this rule is over the final short distance (max. 0.5 metre) as the cables run into the cabinets/units to which they are connected. These short service loops are to allow the cabinets to move on their shock mounts, and to allow maintenance and repair.

- Wherever possible, cable trays must be straight, accessible and placed so as to avoid possible contamination by condensation and dripping liquids (oil, etc.). They must be installed away from sources of heat, and must be protected against physical damage. Suitable shields must be provided where cables are installed in the vicinity of heat sources.
- Unless it is absolutely unavoidable, cables should not be installed across the vessel's expansion joints. If the situation is unavoidable, a loop of cable having a length proportional to the possible expansion of the joint must be provided. The minimum internal radius of the loop must be at least twelve times the external diameter of the cable.
- Where a service requires duplicate supply lines, the cables must follow separate paths through the vessel whenever possible.
- Signal cables must not be installed in the same cable tray or conduit as high-power cables.
- Cables containing insulation materials with different maximum-rated conductor temperatures should not be bunched together (that is, in a common clip, gland, conduit or duct). When this is impractical, the cables must be carefully arranged such that the maximum temperature expected in any cable in the group is within the specifications of the lowest-rated cable.
- Cables with protective coverings which may damage other cables should not be grouped with other cables.
- Cables having a copper sheath or braiding must be installed in such a way that galvanic corrosion by contact with other metals is prevented.
- To allow for future expansion of the system, all cables should be allocated spare conductor pairs. Also, space within the vessel should be set aside for the installation of extra cables.

Radio Frequency interference

All cables that are to be permanently installed within 9 m (30 ft) of any source of Radio Frequency (RF) interference such as a transmitter aerial system or radio transmitters, must, unless shielded by a metal deck or bulkhead, be adequately screened by sheathing, braiding or other suitable material. In such a situation flexible cables should be screened wherever possible.

It is important that cables, other than those supplying services to the equipment installed in a radio room, are not installed through a radio room, high power switch gear or other potential sources of interference. Cables which must pass through a radio room must be screened by a continuous metal conduit or trunking which must be bonded to the screening of the radio room at its points of entry and exit.

Physical protection

Cables exposed to the risk of physical damage must be enclosed in a steel conduit or protected by a metal casing unless the cable's covering (e.g. armour or sheath) is sufficient to protect it from the damage risk.

Cables exposed to an exceptional risk of mechanical damage (for example in holds, storage-spaces and cargo-spaces) must be protected by a suitable casing or conduit, even when armoured, if the cable covering does not guarantee sufficient protection for the cables.

Metallic materials used for the physical protection of cables must be suitably protected against corrosion.

Grounding

All metallic cable coverings (armour, metallic sheathing etc.) must be electrically connected to the vessel's hull at both ends except in the case of final sub-circuits where they should be connected at the supply end only.

Grounding connections should be made using a conductor which has a cross-sectional area appropriate for the current rating of the cable, or with a metal clamp which grips the metallic covering of the cable and is bonded to the hull of the vessel. These cable coverings may also be grounded by means of glands specially intended for this purpose and designed to ensure a good ground connection. The glands used must be firmly attached to, and in good electrical contact with, a metal structure grounded in accordance with these recommendations.

Electrical continuity must be ensured along the entire length of all cable coverings, particularly at joints and splices. In no case should the shielding of cables be used as the only means of grounding cables or units.

Metallic casings, pipes and conduits must be grounded, and when fitted with joints these must be mechanically and electrically grounded locally.

Cable connections

All cable connections are shown on the applicable cable plan and interconnection diagrams.

Where the cable plan shows cable connections outside an equipment box outline, the connections are to be made to a plug or socket which matches the plug or socket on that particular item of equipment.

Where two cables are connected in series via a junction box or terminal block, the screens of both cables must be connected together but not grounded.

Cable terminations

Care must be taken to ensure that the correct terminations are used for all cable conductors, especially those that are to be connected to terminal blocks. In this case, crimped sleeve-terminations must be fitted to prevent the conductor core from fraying and making a bad connection with the terminal block. It is also of the utmost importance that where crimped terminations are used, the correct size of crimp and crimping tool are used. In addition, each cable conductor must have a minimum of 15 cm slack (service loop) left before its termination is fitted.

Cable identification

Cable identification codes corresponding to the cable number shown in the cable plan must be attached to each of the external cables. These identification codes should be positioned on the cable in such a way that they are readily visible after all panels have been fitted. In addition, each cable conductor should be marked with the terminal board number or socket to which it is connected.

INTERFACES AND INTEGRATION

The Simrad ES60 computer provides one or more multi purpose RS-232 and Ethernet ports for external interfaces. On the ES60, these are used for:

- Trawl system (Simrad ITI) interface - Duplex
- Catch monitoring system (Simrad PI Family) interface - Duplex
- Navigation (GPS) (NMEA format) - Input
- Heave sensor - Input
- Temperature sensor - Input
- Sonar system interface - Output
- Depth telegram (NMEA format) - Output
- BI500 processed data - Ethernet
- General Purpose Transceiver - Ethernet

Which interfaces to use, and how many, must be decided by considering the available serial lines on the computer and the need for integration with other fish finding and navigation systems (sonar, catch monitoring, GPS).

Topics

About NMEA interfaces and telegrams on page 83

BI500 interface on page 85

Transceiver interface on page 85

Trawl system interface on page 87

Catch monitoring system interface on page 88

Navigation system interface on page 90

Heave sensor interface on page 90

Temperature sensor interface on page 92

Sonar system interface on page 92

Depth interface on page 94

External triggering on page 95

GPT Auxiliary connector on page 96

About NMEA interfaces and telegrams

By means of the connectors on the ES60 computer, the echo sounder can communicate with several peripheral devices. This is useful, as it allows you to export and import information to and from these devices. In order to establish this communication, the devices on each end of the cable must speak the same “language".

NMEA

The *National Marine Electronics Association (NMEA)* has defined communication standards for maritime electronic equipment, and the ES60 echo sounder conforms to these standards. The most common standard is *NMEA 0183*, and the National Marine Electronics Association describes it as follows:

- The NMEA 0183 Interface Standard defines electrical signal requirements, data transmission protocol and time, and specific sentence formats for a 4800 baud serial data bus. Each bus may have only one talker but many listeners.

For more information about the National Marine Electronics Association and the NMEA 0183 standard, refer to the organization's web pages at www.nmea.org.

Telegrams

To move information between two electronic units, the data are collected in **telegrams**. The content (protocol) of each telegram is defined by the NMEA standard, and several telegram types exist to allow different type of data to be distributed.

The phrase **datagram** is also frequently used about this communication method.

Unless you wish to write your own software, you do not need to know how these telegrams are designed. However, whenever you set up equipment interfaces, you need to ensure that each system on your communication line is set up to send and receive the same telegram. The standard allows one system to send data (a "talker") and several others to receive data simultaneously ("listeners") on the same line. Therefore, you must ensure that all products receiving data on a communication line is set up to receive the same telegram(s) that the transmitting product provides.

Standard NMEA 0183 communication parameters

The communication parameters defined for **NMEA 0183**are:

- 4800 bits per second
- 8 data bits
- no parity
- one stop bit

Some instruments will also offer other parameters and/or choices.

Ethernet interfaces

The following interfaces are set up to transmit and receive information by means of ethernet lines.

- BI500
- General Purpose Transceiver

BI500 interface

The ES60 can communicate with an external devices that can benefit from the processed data. Such devices include the Olex chart plotter system. This communication is controlled by the **BI500** dialogue box.

The following telegrams may be exported:

- Parameter
- Echogram
- Echo trace
- Navigation
- Vessel log

The interface will require the absolute identity of the remote UDP port and the remote IP address.

Wiring procedure

1. Locate the Ethernet port you wish to use.
2. If no Ethernet port is available, an Ethernet switch may be inserted between the computer and the transceiver.
3. If you connect an Ethernet cable directly between the ES60 computer and a remote computer, you must use a Ethernet cable. If you connect the other computer by means of an Ethernet switch, you must use “straight” Ethernet cables.

Setup procedure

1. On the ES60, access the **Install** menu, and open the **BI500** dialogue box.
2. Click to select which datagrams you wish to export, and set up the other parameters to suit your special requirements.
3. Define the **Remote UDP Port**.
4. Define the **Remote IP Address** for the computer you wish to export the information to.

Related topics

Ethernet cable with RJ45, “straight” on page 52

Ethernet cable with RJ45, “crossover” on page 53

Transceiver interface

The ES60 computer communicates with the General Purpose Transceiver using one or more Ethernet cables. The number and type of cables required depends on the system configuration.

The following basic configurations exist:

- One transceiver: Use a “crossover” cable between the computer and the transceiver
- Two or more transceivers: Use “straight” cables between the computer and the Ethernet switch, and between the switch and the transceivers.

Wiring procedure, one transceiver

1. Locate the Ethernet port you wish to use on the computer.
2. Connect a “crossover” cable from the computer’s Ethernet socket to the socket on the General Purpose Transceiver.

Wiring procedure, two or more transceivers

1. Locate the Ethernet port you wish to use on the computer.
2. Install an Ethernet switch.
3. Connect a “straight” cable from the computer’s Ethernet socket to the “uplink” socket on the Ethernet switch.
4. Connect “straight” cables from Ethernet switch’s remaining sockets to each of the General Purpose Transceivers.

Setup procedure

Note that you will only need to carry out this procedure if you set up an echo sounder system using a locally purchased computer!

1. On the ES60, exit the echo sounder program, and access the **Desktop**.
2. Click the **Start** button in the bottom left corner of the desktop. On the menu, select **Settings**, and then **Control Panel**.
3. On the **Control Panel**, select **Network connections**.
4. Double-click on **Local Area Connection** to open the **Local Area Connection Status** dialogue box.
5. At the bottom of the dialogue, click **Properties**.
6. In the **Local Area Connection Properties** dialogue, select **Internet Protocol (TCP/IP)**, and click **Properties**.
7. Observe that the **Internet Protocol (TCP/IP) Properties** dialogue opens.
8. Click **Use the following IP address**, and enter IP address: **157.237.14.12**.
   - Observe that the *Subnet mask* and *Default gateway* addresses appear automatically. You do not need to change these.
9. Click **Ok** to exit the **Internet Protocol (TCP/IP) Properties** dialogue.

10 Click **Ok** to exit the **Local Area Connection Properties** dialogue.

11 Click **Close** to exit the **Local Area Connection Status** dialogue.

Setting up the General Purpose Transceiver(s)

Note that you will only need to perform this procedure the first time you switch on the echo sounder.

1 Start the ES60 application.

2 Open the **Install** menu, and select **Transceiver installation**.

3 Click **Modify** to change the settings.

4 Observe that the General Purpose Transceiver(s) currently connected to the computer appears automatically.

5 Click to select the first transceiver, and choose transducer using the **Transducer Selection** selector. Repeat for all transceivers.

6 Click **Ok** to close the dialogue.

Related topics

Ethernet cable with RJ45, "straight" on page 52

Ethernet cable with RJ45, "crossover" on page 53

Duplex interfaces

The following interfaces are set up for duplex (two-way) communication.

- Trawl instrumentation (ITI)
- Catch monitoring systems (PI family)

Trawl system interface

Communication with the Simrad ITI (Integrated Trawl Instrumentation) is based on NMEA telegrams. This is a two-way serial communication line, and the following information is exchanged:

- From ES60 to ITI: Sounder depth below surface ($SDDBS telegram)
- From ITI to ES60: Depth of trawl below surface ($IIDBS telegram)
- From ITI to ES60: Trawl headrope to footrope ($IIHFB telegram)

Wiring procedure

1 Locate a free RS-232 serial port that can be used to connect the ITI system.

2 On the ES60 computer, connect the receive signal **Rx** on pin 2, the transmit signal **Tx** on pin 3, and **ground** on pin 5.

3 On the ITI transceiver, use connector **Serial A**. Connect the receive signal **Rx** on pin 2, the transmit signal **Tx** on pin 3, and **ground** on pin 5.

4 Ensure that the length of the cable does not exceed approximately 50 meters. If a longer cable is required, you may need to use buffer amplifiers on the serial line.

Setup procedure

1 On the ES60, access the **Install** menu, and open the **Trawl Interface** dialogue box.

2 Click the **RS232** button to open the **RS232 Setup** dialogue.

3 Enter the identification of the RS-232 port you have used to make the connection.

4 Enter the correct communication parameters, and click **OK**.

5 Ensure that the transmit parameters on the ITI matches the receive parameters on the ES60.

6 Click the **Depth output** button to open the **Depth Output** dialogue.

7 Click **Depth output** to enable the communication.

8 For **Telegram**, select **$SDDBS**.

9 Click **Ok** to exit the **Depth Output** dialogue.

10 Click **Ok** to exit the **Trawl Interface** dialogue.

Related topics

Generic RS-232 Serial line cable on page 47

Cable between ITI and echo sounder on page 64

Catch monitoring system interface

Communication with the Simrad PI Family catch monitoring systems is based on NMEA telegrams. This is a two-way serial communication line, and the following information is normally exchanged:

- From ES60 to PI: Sounder depth below surface ($SDDBS telegram)
- From PI to ES60: Data output (PSIMP,D)

The PI system can export other information as well, but only the mentioned data can be processed and used by the echo sounder.

Wiring procedure

1 Locate a free RS-232 serial port that can be used to connect the PI system.

2 On the ES60 computer, connect the receive signal **Rx** on pin 2, the transmit signal **Tx** on pin 3, and **ground** on pin 5.

3 On PI44 and PI54, use either connector **NMEA1** or **NMEA2**. Connect the receive signal **Rx** on pin 8, the transmit signal **Tx** on pin 6, and **ground** on pins 7 and 9.

4 On PI30 and PI32, use connector **NMEA**. Connect the receive signal **Rx** on pin 3, the transmit signal **Tx** on pin 1, and **ground** on pins 2 and 4.

5 Ensure that the length of the cable does not exceed approximately 50 meters. If a longer cable is required, you may need to use buffer amplifiers on the serial line.

Setup procedure

1 On the ES60, access the **Install** menu, and open the **Purse Interface** dialogue box.

2 Click the **RS232** button to open the **RS232 Setup** dialogue.

3 Enter the identification of the RS-232 port you have used to make the connection.

4 Enter the correct communication parameters, and click **OK**.

5 Ensure that the transmit parameters on the PI system matches the receive parameters on the ES60.

6 Click the **Depth output** button to open the **Depth Output** dialogue.

7 Click **Depth output** to enable the communication.

8 For **Telegram**, select **$SDDBS**.

9 Click **Ok** to exit the **Depth Output** dialogue.

10 Click **Ok** to exit the **Purse Interface** dialogue.

Related topics

Generic RS-232 Serial line cable on page 47

Cable between PI44/54 and echo sounder on page 65

Cable between PI30/32 and echo sounder on page 66

Input interfaces

The following interfaces are set up to receive information from external devices.

- Navigation system
- Heave sensor
- Temperature sensor

Navigation system interface

GPS (Global Positioning System) receivers output NMEA 0183 telegrams containing geographical latitude and longitude. Most navigation receivers also allow different parameters to be entered.

Wiring procedure

1. Locate a free RS-232 serial port that can be used to connect the navigation receiver.
2. On the ES60 computer, connect the receive signal **Rx** on pin 2, and **ground** on pin 5.
3. On the GPS system, connect the transmit signal **Tx** on pin 3, and **ground** on pin 5.
4. Ensure that the length of the cable does not exceed approximately 50 meters. If a longer cable is required, you may need to use buffer amplifiers on the serial line.

Setup procedure

1. Refer to the documentation provided with the GPS system, and establish which NMEA sentence(s) that are used for communication.
2. On the ES60, access the **Install** menu, and open the **Navigation Interface** dialogue box.
3. For **Position Input Protocol**, select **NMEA**.
   - By default, all NMEA sentences are read. If you wish to read only one sentence, click the **Advanced** button to choose.
4. Click the **RS232** button to open the **RS232 Setup** dialogue.
5. Enter the identification of the RS-232 port you have used to make the connection.
6. Enter the correct communication parameters, and click **OK**.
7. Ensure that the transmit parameters on the GPS system matches the receive parameters on the ES60.

Related topics

Generic RS-232 Serial line cable on page 47

Heave sensor interface

The ES60 Fish finding echo sounder can accept inputs from both analogue and digital heave sensors. A sensor with an analogue output is connected directly to the **Auxiliary** connector on the General Purpose Transceiver, while a digital sensor is connected to one of the serial inputs using RS-232.

If more than one transceiver is used by the echo sounder system, the analogue sensor is connected to only one of them.

Wiring procedure, analogue sensor

1. On the ES60 Fish finding echo sounder, connect the positive signal from the sensor to pin 3 on the **Auxiliary** connector on the General Purpose Transceiver.
2. Connect the negative signal from the sensor to pin 16 on the **Auxiliary** connector.
   - The negative heave input signal (pin 16) is grounded at the sensor in order to prevent ground potential offsets between the sensor and the transceiver from adding to the sensed signal.
   - Maximum cable length is virtually unlimited.

Wiring procedure, digital sensor (RS-232 interface)

1. Locate a free RS-232 serial port that can be used to connect the heave sensor.
2. On the ES60 computer, connect the receive signal **Rx** on pin 2, and **ground** on pin 5.
3. On the heave sensor, connect the transmit signal **Tx** on pin 3, and **ground** on pin 5.
4. Ensure that the length of the cable does not exceed approximately 50 meters. If a longer cable is required, you may need to use buffer amplifiers on the serial line.

Setup procedure, analogue sensor

1. On the ES60, access the **Install** menu, and open the **Heave sensor** dialogue box.
2. For **Source selection**, select **Analog**.
3. Select which transceiver you have connected the heave sensor to.

Setup procedure, digital sensor (RS-232 interface)

1. On the ES60, access the **Install** menu, and open the **Heave sensor** dialogue box.
2. Click the **RS232** button to open the **RS232 Setup** dialogue.
3. Enter the identification of the RS-232 port you have used to make the connection.
4. Enter the correct communication parameters, and click **OK**.
5. Ensure that the transmit parameters on the heave sensor matches the receive parameters on the ES60.

Related topics

GPT external sensors on page 60

Temperature sensor interface

The ES60 Fish finding echo sounder will accept input from an analogue temperature sensor.

If more than one transceiver is used by the echo sounder system, the temperature sensor is connected to only one of them.

Wiring procedure

1. On the ES60 Fish finding echo sounder, connect the positive signal from the sensor to pin 4 on the **Auxiliary** connector on the General Purpose Transceiver.
2. Connect the ground signal from the temperature sensor to pin 17 on the **Auxiliary** connector.

Setup procedure

1. On the ES60, access the **Install** menu, and open the **Temperature sensor** dialogue box.
2. For **Source selection**, select **Analog input**.
3. Select which transceiver you have connected the temperature sensor to.
   - When the sensor is operational, you will be able to follow the temperature readings in the dialogue box.

Related topics

GPT external sensors on page 60

Output interfaces

The following interfaces are set up to transmit information to external devices.

- Sonars
- Depth

Sonar system interface

The current depth from a defined transceiver channel can be sent out on a serial line to a sonar system. You can only use the serial lines already set up to accept input from other peripherals. One or more of the following serial lines can be used:

- Heave Sensor
- Navigation Interface
- Trawl Interface

Note that the depth information is normally also provided on the duplex interfaces to trawl instrumentation and catch monitoring systems.

Wiring procedure

1 Locate the RS-232 serial port that can be used to connect the sonar system.

2 On the ES60 computer, connect the transmit signal **Tx** on pin 3, and **ground** on pin 5.

3 On the Sonar Interface Unit, use one of the serial line connectors **TB1** through **TB7**. Connect the receive signal **Rx** on pin 1, and **ground** on pin 5.

4 Ensure that the length of the cable does not exceed approximately 50 meters. If a longer cable is required, you may need to use buffer amplifiers on the serial line.

Setup procedure

1 On the ES60, access the **Install** menu, and

2 If you wish to use the same serial line as the Navigation input, open the **Navigation Interface** dialogue box.

3 If you wish to use the same serial line as the Heave input, open the **Heave Sensor** dialogue box.

4 If you wish to use the same serial line as the Trawl input, open the **Trawl Interface** dialogue box.

5 Click the **Depth output** button to open the **Depth Output** dialogue.

6 Click **Depth Output** to enable the output.

7 Click **Channel** to select which transceiver and frequency you wish to retrieve and export the depth information from.

- In most cases, the lowest frequency is used.

8 Click **Telegram** to choose which format to use on the output communication.

- The $SDDBS telegram contains the depth below the surface.
- The $SDDBT telegram contains the depth below the transducer.
- The $SDDPT telegram contains the depth below the transducer and the distance between the transducer and the water line.
- The Simrad telegram outputs information compatible for EA500 and EK500 echo sounders.
- The Atlas telegram outputs information compatible for Atlas echo sounders.

9 Choose the telegram you wish to use.

Related topics

Generic RS-232 Serial line cable on page 47

Cable between SH/SP sonar and echo sounder on page 67

Depth interface

The current depth from a defined transceiver channel can be sent out on a serial line. In order to economize with the serial ports, you can only use the serial lines already set up to accept input from other peripherals. One or more of the following serial lines can be used:

- Heave Sensor
- Navigation Interface
- Trawl Interface

Note that the depth information is normally also provided on the duplex interfaces to trawl instrumentation and catch monitoring systems.

Wiring procedure

1 Locate which RS-232 port you wish to use.

2 The ES60 Fish finding echo sounder, connect the transmit signal **Tx** on pin 3, and **ground** on pin 5.

3 On the remote system, connect the receive signal **Rx** on pin 2, and **ground** on pin 5.

4 Ensure that the length of the cable does not exceed approximately 50 meters. If a longer cable is required, you may need to use buffer amplifiers on the serial line.

Setup procedure

1 Refer to the documentation provided with the remote system, and establish which NMEA sentence(s) that can be used for communication.

2 On the ES60, access the **Install** menu, and

3 If you wish to use the same serial line as the Navigation input, open the **Navigation Interface** dialogue box.

4 If you wish to use the same serial line as the Heave input, open the **Heave Sensor** dialogue box.

5 If you wish to use the same serial line as the Trawl input, open the **Trawl Interface** dialogue box.

6 Click the **Depth output** button to open the **Depth Output** dialogue.

7 Click **Depth Output** to enable the output.

8 Click **Channel** to select which transceiver and frequency you wish to retrieve and export the depth information from.

- In most cases, the lowest frequency is used.

9 Click **Telegram** to choose which format to use on the output communication.

- The $SDDBS telegram contains the depth below the surface.
- The $SDDBT telegram contains the depth below the transducer.
- The $SDDPT telegram contains the depth below the transducer and the distance between the transducer and the water line.
- The Simrad telegram outputs information compatible for EA500 and EK500 echo sounders.
- The Atlas telegram outputs information compatible for Atlas echo sounders.

Related topics

Generic RS-232 Serial line cable on page 47

External triggering

Whenever more than one hydroacoustic system (echo sounder or sonar) is installed on a vessel, interference may occur. To avoid this, the systems may either be connected to a common synchronization system, or one of the acoustic systems may be defined as a *Master*.

The ES60 echo sounder include interface for remote transmit synchronisation. The system can be set up to operate in either *Master* or *Slave* mode in relation to an external synchronization or hydroacoustic system.

The ES60 system may comprise more than one General Purpose Transceiver. If the ES60 operates as a *Master*, the synchronization between these are controlled by the echo sounder software. If the echo sounder operates as a *Slave* system, the transceivers must be individually controlled by the *Master* system.

Note

In its default configuration, the ES60 is set up to operate as a Master. Special action must be taken to re-configure the echo sounder for Slave operation.

Master system

When the ES60 system is set up to operate as a *Master* in a system, the **TrigOut** signal from the transceiver's **Auxiliary** connector must be connected to the external trigger input on the other hydroacoustic system(s). If more than one transceiver is

used by the *Master* system, the **TrigOut** signal must be taken from the active transceiver. Two **TrigOut** signals are available for either positive or negative triggering. When activate, the trigger signal will allow all the systems to transmit simultaneously.

Note

Simultaneous transmission of more than one system can only take place if the systems operate with different frequencies!

The **TrigOut+** signal is an open collector output (max 100 mA) containing a 100 kohm pullup resistor to +5 Vdc. This signal is normally low. The **TrigOut+** signal goes high when the transceiver is ready to transmit, and it goes low again when all frequency channels of the transceiver have finished transmitting.

TrigOut- is the inverse of **TrigOut+**.

Connect the ground wire to one of the **Ground** pins (18-22).

Related topics

GPT trigger / synchronisation on page 59

Slave system

If an external system is used to provide the transmit trigger, the trigger signal must be connected to one of the **TrigIn** inputs on the transceiver's **Auxiliary** connector. When activated. the trigger signal from the external system will allow the ES60 system to transmit.

If more than one transceiver is used by the *Slave* system, the input trigger must be connected to all the transceivers in parallel.

Two **TrigIn** inputs are available for either positive or negative triggering. The **TrigIn-** input is sensitive to a high-to-low transition.

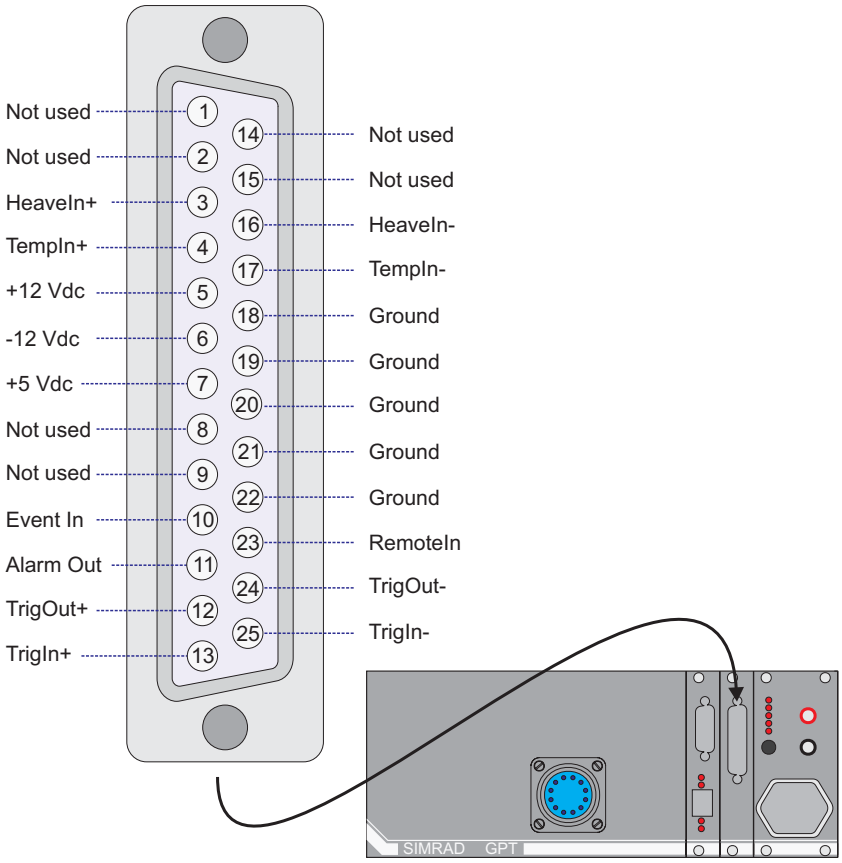
Connect the ground wire to one of the **Ground** pins (18-22).

Related topics

GPT trigger / synchronisation on page 59

GPT Auxiliary connector

The ES60 General Purpose Transceiver (GPT) board contains a 25-pin female Delta connector handling various external interface signals.



Interfaces on the Auxiliary plug

- Analogue heave sensor (pins 3 and 16)
  - One differential input is connected to the sensor output terminal, the other input is grounded at the sensor in order to prevent ground potential offsets between the sensor and the transceiver from being adding to the sensed signal. The differential input range is ±10 V.
- Temperature sensor (pins 4 and 17)
  - Some transducers contain a built-in temperature sensitive resistor, normally 10 kohm at 25°C. This resistor is used to measure the water temperature.
- Supply voltages (output)
  - Pin 5: +12 Vdc, max 100 mA (Ground on pin 18)
  - Pin 6: -12 Vdc, max 100 mA (Ground on pin 19)
  - Pin 7: +5 Vdc, max 200 mA (Ground on pin 20)

- Transmit synchronisation (pins 12, 13, 23, 24 and 25)
  - **TrigIn** and **TrigOut** are digital signals provided for transmit synchronisation with external equipment of various makes.
  - The two **TrigOut** signals are open collector outputs (max 100 mA) containing a 100 kohm pull-up resistor to +5 Vdc.
  - **TrigOut+** is normally low, and **TrigOut-** is the logical inverse of **TrigOut+**.
  - In internal trigger mode the sounder starts transmitting as soon as it is ready for the next ping. **TrigOut+** goes high (output transistor is not conducting) when the transmit pulse starts, and it goes low again when all frequency channels within the transceiver have finished transmitting. The **TrigIn** signals are totally disregarded.
  - In external trigger mode the behaviour of these signals is slightly different. Transmission is delayed until a pulse is detected at one of the **TrigIn** inputs; a low-to-high transition at the **TrigIn+** input or a high-to-low transition at the **TrigIn-** input. **TrigOut+** goes high when the transceiver is ready to transmit, and it goes low again when all frequency channels within the transceiver have finished transmitting.
  - The **RemoteIn** signal at pin 23 switches the transceiver on/off. Left open the transceiver is on. If grounded (less than +2.5 Vdc) the transceiver is off.
- Event in
  - Use a simple non-locking push-to-make switch to trigger an event. A vertical line is drawn on the echogram
- Alarm out
  - A positive (+ 5Vdc) level is provided when the alarm is enable.
  - Note that this output must not be used to power lamps, speakers or sounder directly. The alarm signal must be connected to an opto-coupler, a relay or a similar device to power peripheral alarm units.

Related topics

GPT remote on/off on page 58

GPT trigger / synchronisation on page 59

GPT external sensors on page 60

GPT Event and New line on page 61

GPT Alarm output on page 62

DRAWING FILE

This chapter contains relevant drawings related to the electrical and physical installation of the ES60 Fish finding echo sounder.

Note

The mechanical drawings are for information and guidance only. They are not in scale. All dimensions are in mm unless otherwise is noted.

The original installation drawings are available on PDF and/or AutoCad's DWG format. Visit www.simrad.com to download.

Drawings

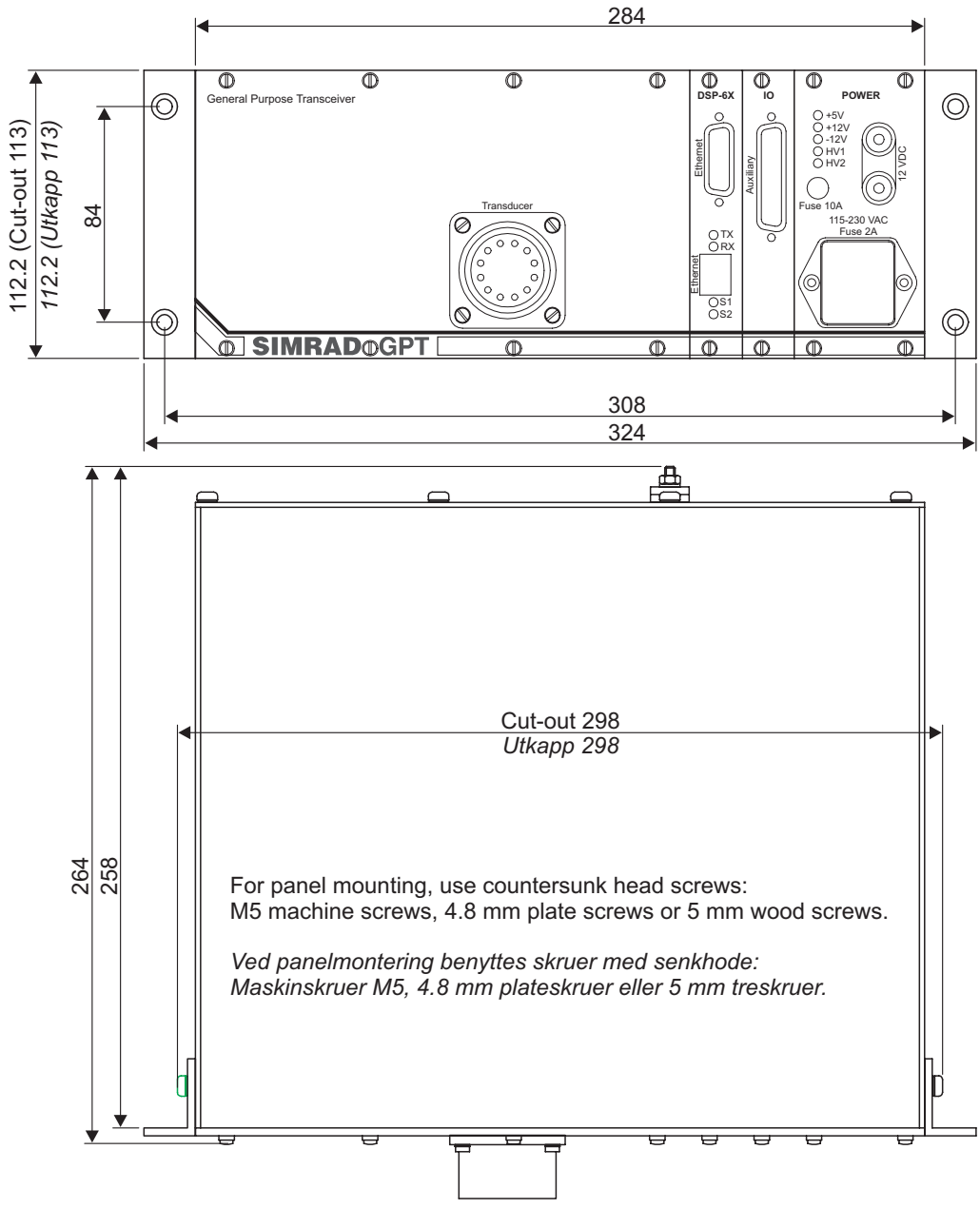
GPT Outline dimensions on page 100

GPT Power supply outline dimensions on page 102

Marine computer outline dimensions on page 104

GPT Transducer plug connection on page 105

GPT Outline dimensions



Note:
All measurements are in mm.
The drawing is not in scale.

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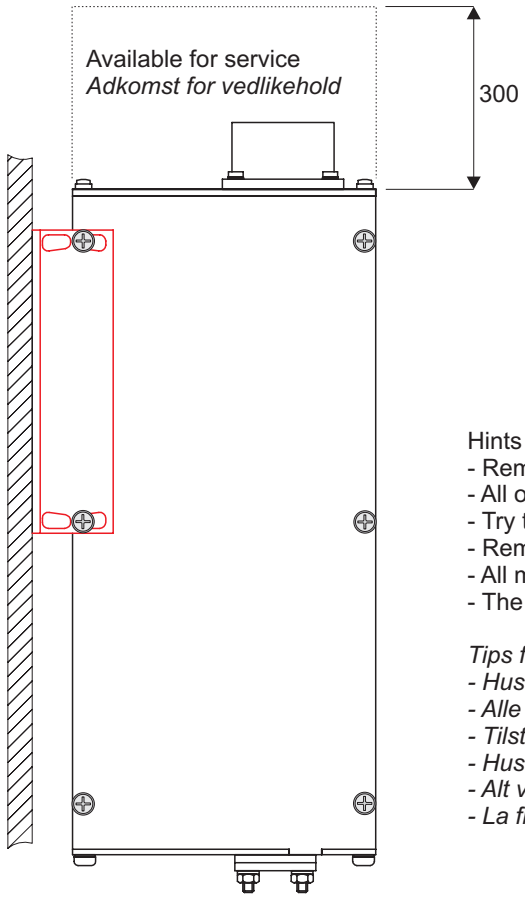
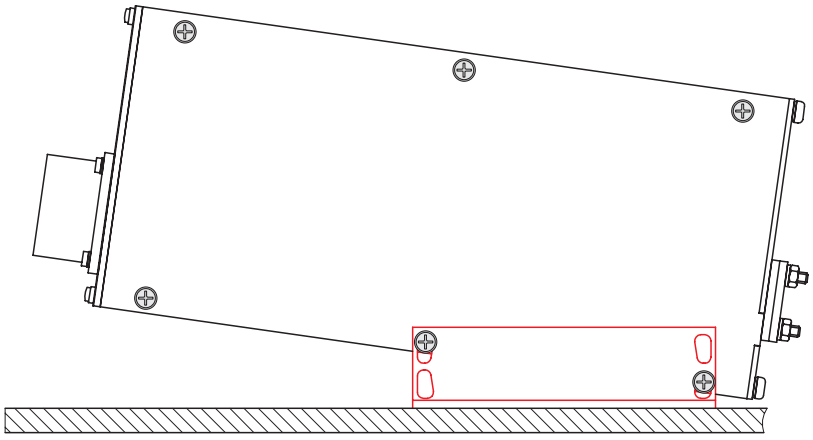


Mounting examples
Monteringseksempler

Hints for installation:
- Remember the earth connection on the rear panel.
- All other connections are made on the front panel.
- Try to make the wiring simple.
- Remember to make room for maintenance.
- All maintenance is made from the front.
- The front panel should be visible.

Tips for installasjon:
- Husk jordtilkopling på bakpanelet.
- Alle andre tilkopling gjøres på frontpanelet.
- Tilstreb enkel kabling.
- Husk å lage adkomst for vedlikehold.
- Alt vedlikehold skjer fra fronten.
- La frontplaten være synlig.



Note:
All measurements are in mm.
The drawing is not in scale.

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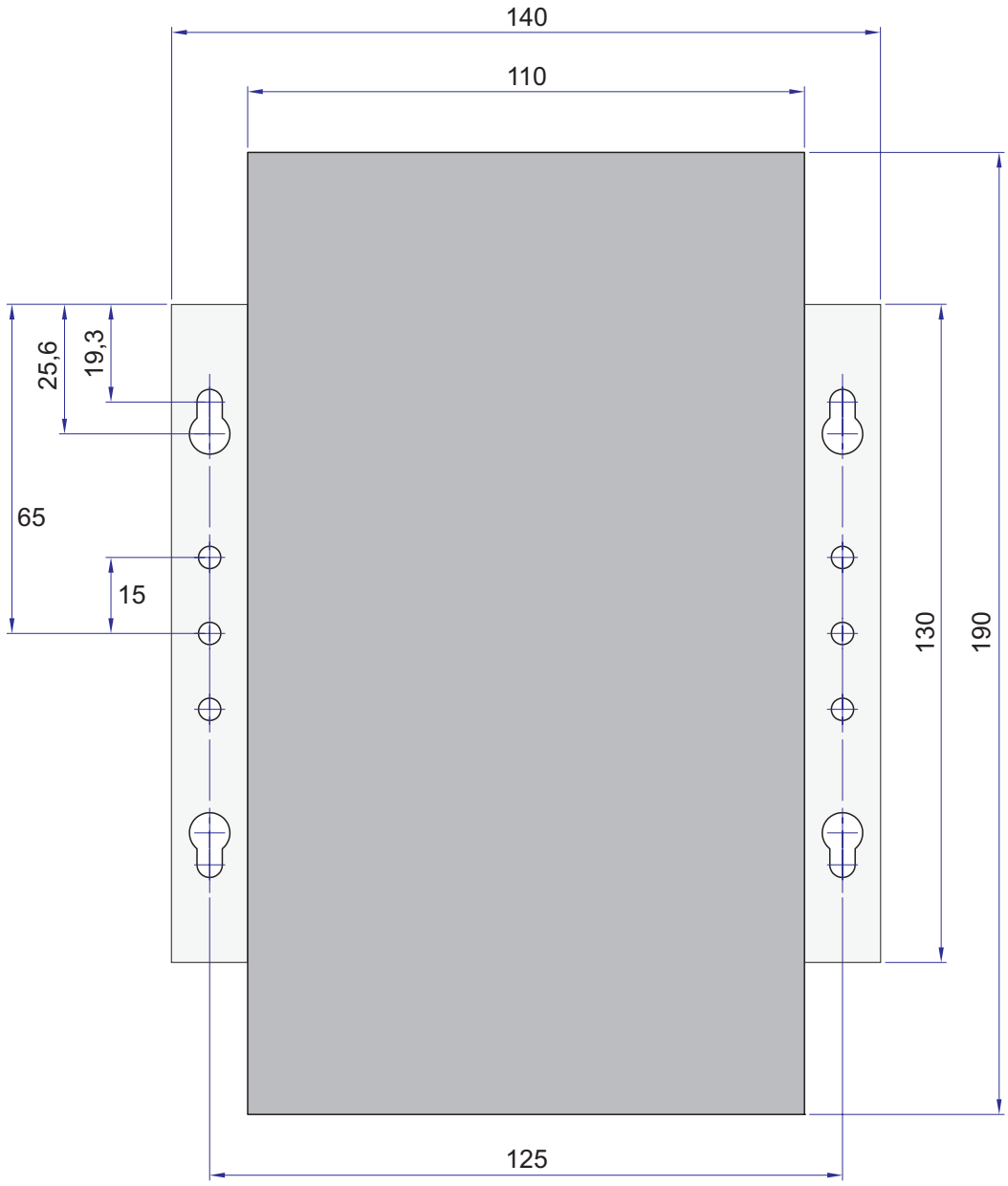
820-201035 Rev.C

GPT Power supply outline dimensions



Note:
All measurements are in mm.
The drawing is not in scale.

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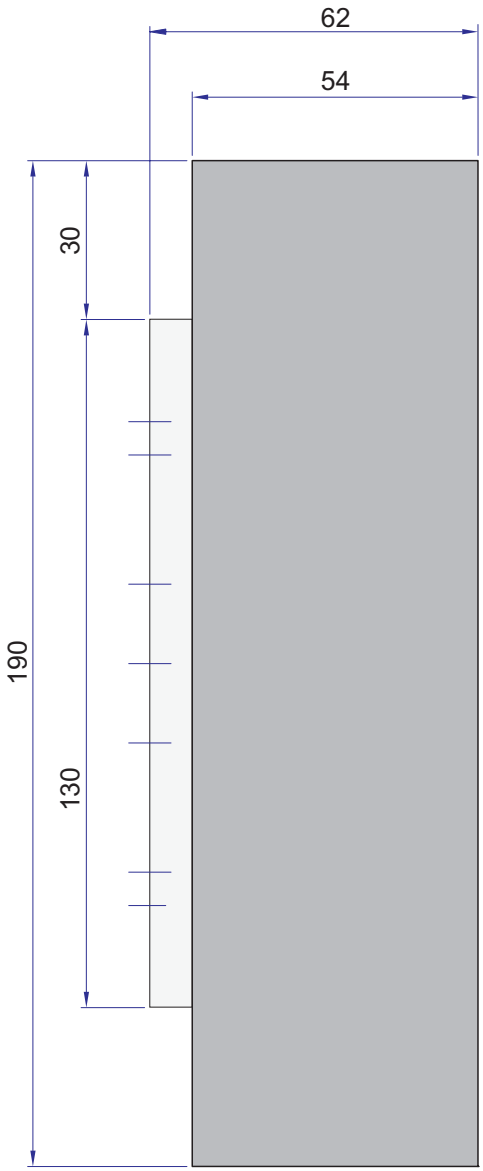
305274 Rev.A



Note:
All measurements are in mm.
The drawing is not in scale.

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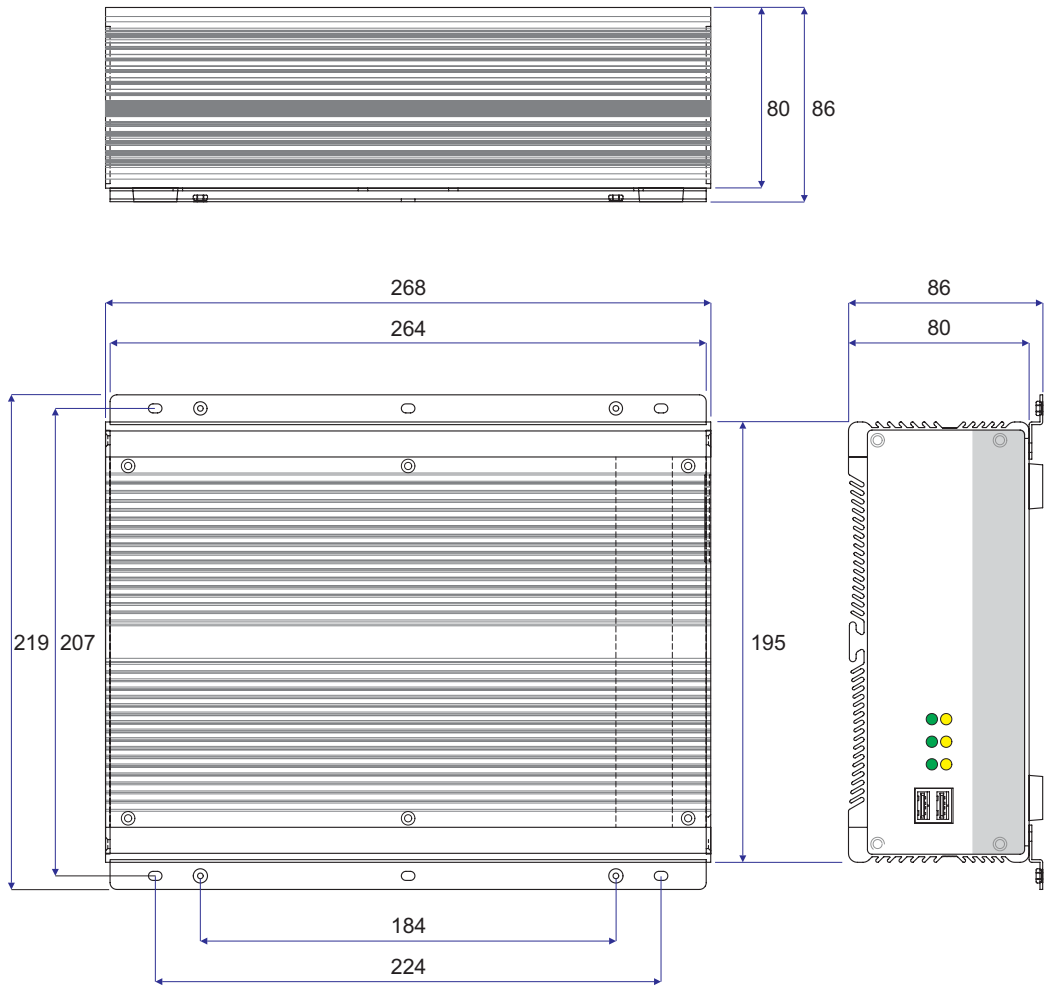
305274 Rev.A

Marine computer outline dimensions



Note:
All measurements are in mm.
The drawing is not in scale.

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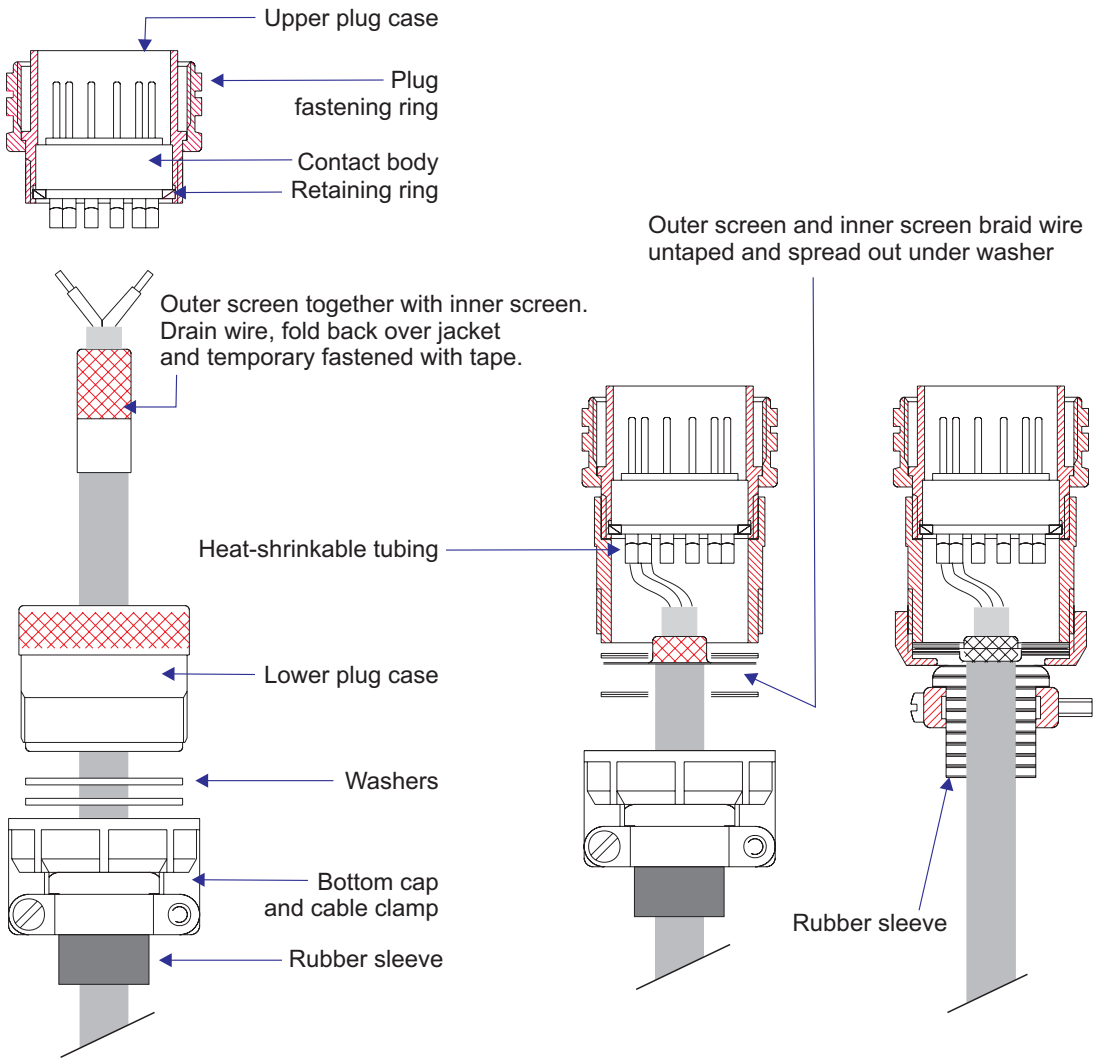
Rev.A

GPT Transducer plug connection



Note:
All measurements are in mm.
The drawing is not in scale.

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824-201575 Rev.C

TECHNICAL SPECIFICATIONS

This chapter lists the main technical specifications.

Note

We reserve the right to alter technical specifications without prior notice.

Topics

Echo sounder specifications on page 106

Interface specifications on page 106

General Purpose Transceiver specifications on page 107

Colour display specifications on page 108

ES60 Marine Computer specifications on page 108

Echo sounder specifications

- **Frequency channels:** 1, 2, 3 or 4 channels
- **Operating frequencies:** 12, 18, 27, 38, 50, 70, 120, 200 kHz
- **Echogram types:**
  - Surface echogram
  - Bottom expansion
  - Trawl echogram
- **Gain functions:**
  - 20 log TVG (= bottom gain)
  - 20 log TVG (=school gain)
  - 40 log TVG (= fish gain)
- **Ping rate:** Adjustable, maximum 10 pings per second
- **Start depth and range:** 5 to 15,000 meters in Manual, Auto range or Auto start modes.
- **Scope presentation:** Displays the echo strength of the most recent ping.
- **Colour scale:** 12 colours (3 dB pr colour)
- **Bottom detector:** Software tracking algorithm, adjustable minimum and maximum depth

Interface specifications

Numerous external interfaces are provided for the ES60 Fish finding echo sounder system.

- **Outputs:**
  - Echogram printer (Centronics parallel or USB depending on computer make and model)
  - Bottom depth (Serial line, NMEA format)
  - Depth data (Serial line, NMEA, Simrad or Atlas formats)
- **Inputs:**
  - Navigation receiver (Serial line, NMEA format)
  - Motion sensor (Heave, roll and pitch)
  - Analogue heave, roll and pitch (+/- 10 V)
  - Annotation
  - Transmit synchronization
  - Temperature sensor
- **Remote control toggle switch:**
  - Survey Line
  - Remote power
  - Transmit synchronization

General Purpose Transceiver specifications

- **Transmit power:**
  - Max 2 kW (Dual frequency GPT)
  - Max 4 kW (Single frequency GPT)
- **Receiver noise figure:** 3 dB
- **Transducer impedance:** 60 ohms
- **Output protection:** Short circuit and open circuit protection
- **Receiver input range:** Instantaneous dynamic amplitude range -160 dBW to -20 dBW (dB relative to 1W)
- **Connectors:**
  - Transducer: 12-pin female Amphenol, Shell MS3102A-24, Insert 24-19S
  - AUI: 15-pin female Delta
  - Network: 8-pin RJ-45 socket
  - Auxiliary: 25-pin female Delta
- **Physical dimensions:**
  - Width: 284 mm
  - Height: 112 mm
  - Depth: 246 mm
  - See also: *GPT Outline dimensions* on page 100

- **Weight:**
  - With one transmitter board: 2.7 kg
  - With two transmitter boards: 3.3 kg
  - With three transmitter boards: 4.5 kg
- **Standard supply power:**
  - AC operation: 95 to 265 Vac, 50-60 Hz, 50-100 W
  - DC operation: 11 to 15 Vdc, 50-100 W
- **External power supply for specific configurations:**
  - AC input: 230 Vac, 50–60 Hz
  - DC output: 13.2 Vdc, 10 A
  - Physical size (excluding mounting brackets) (WDH): 110 x 190 x 54 mm
  - See also: *GPT Power supply outline dimensions* on page 102
- **Fuses:**
  - AC fuse: Ø5x20 mm, 2 A slow
  - DC fuse: Ø5x20 mm, 10 A slow or fast
- **Operational temperature:** 0 to +55°C
- **Storage temperature:** -40 to +70°C
- **Humidity:** 5 to 95% relative non-condensing

Colour display specifications

Commercial display

The ES60 Fish finding echo sounder may be supplied with one of several LCD displays, and several sizes are available. Specifications are supplied with the displays. Refer to the applicable documentation provided with the unit for more information.

ES60 Marine Computer specifications

- **Mechanical construction:**
  - Chassis: Aluminum
  - Cooling: Integrated cooling ribs
  - Mounting: Brackets on each side
- **Physical dimensions:**
  - Depth: 195 mm
  - Width: 268 mm
  - Height: 80 mm

- **Processor and memory:**
  - Procesor: Celeron® M
  - Clock frequency: 1.3 GHz
  - Front Side Bus (FSB): 400 MHz
  - Chipset: Intel® 852 GM(E)
  - RAM: 512 Mb (Max 2 Gb)
  - Hard disk: 4 Gb FlashDisk
  - PCI support: One card
- **Interfaces:**
  - USB 2.0: 6 sockets
  - Keyboard/mouse: Single PS/2 connector (adapter is included)
  - Serial lines: 4 ea RS-232 (adapter is included)
  - Audio: Microphone input, Loudspeaker output
  - LVDS (Low Voltage Differential Signaling): 1 ea
  - Network: 2 ea 10/100 Ethernet LAN
  - Video: VGA
  - TV output: S-Video TV output
- **Power requirements:**
  - External power supply: 100 to 240 Vac input, +19 Vdc output
  - DC operation: +12 to 30 Vdc
- **Environmental specifications:**
  - Operating temperatures: -10 to +50°C
  - Storage temperatures: -20 to +80°C
  - Relative humidity: 10 to 90% (non-condensing)
- **Certification:**
  - CE
  - FCC

TRANSDUCER INSTALLATION

The purpose of this chapter is to provide generic descriptions and illustrations allowing the reader to understand the basic principles for echo sounder transducer installation.

Note

The information in this document must be regarded as general guidelines and recommendations only. The installation shipyard must design and manufacture installation hardware to fit each individual transducer and vessel.

Whenever required, the installation shipyard must also have the installation approved by the applicable maritime authorities.

For detailed information about the transducer to be installed, refer to the documentation provided with the transducer. Drawings and descriptions can also be downloaded from www.simrad.com.

Topics

Transducer location on page 110

Ways of mounting the transducer on page 114

Cable glands on page 136

Steel conduit on page 140

Handling and maintenance on page 141

Transducer location

A single answer to the question where to locate the transducer cannot be given. It depends very much on the vessel's construction. However, there are some important guide lines.

Go deep

The upper water layers of the sea contain a myriad of small air bubbles created by the breaking waves. In heavy seas the uppermost 5 to 10 metres may be air-filled, with the highest concentrations near the surface. Air bubbles absorb and reflect the sound energy, and may in worst cases block the sound transmission totally. Therefore, mount the transducer at a deep position on the hull.

Consider the situation when the vessel is unloaded, and when it is pitching in heavy seas.

WARNING

The transducer must never be lifted free of the water surface.

Not only will the sound transmission be blocked, but the transducer may be damaged by slamming against the sea surface.

Another reason to go deep is cavitation in front of high power transducers. Cavitation is the formation of small bubbles in the water due to the resulting local pressure becoming negative during parts of the acoustic pressure cycles. The cavitation threshold increases with the hydrostatic pressure.

Vessel heave

Heave is the up and down movement of the vessel. It disturbs the echo traces in the echogram, so that a flat bottom is displayed as a wave. A transducer location in the middle of the vessel minimises the influence of vessel roll and pitch.

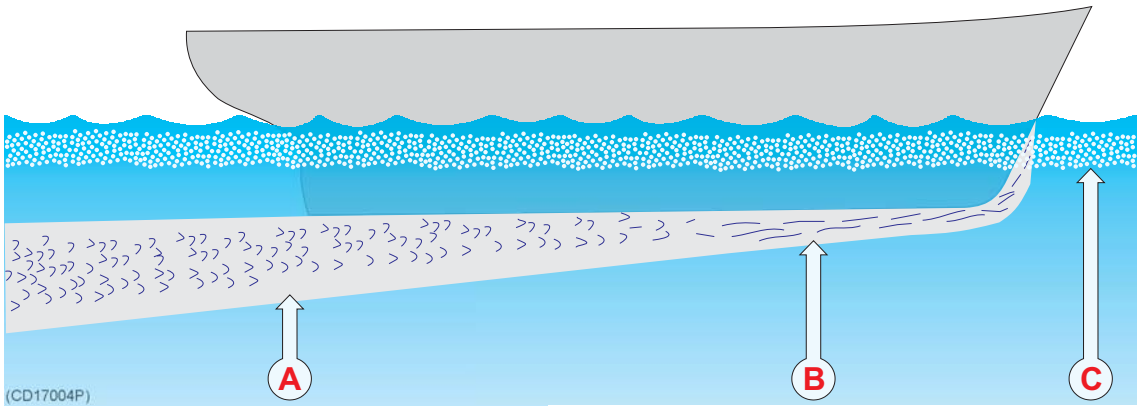
Noise from protruding objects on the hull

Objects protruding from the hull, such as zinc anodes, sonar transducers or even the vessel's keel, generate turbulence and flow noise. Also holes and pipe outlets are noise sources. They may act as resonant cavities amplifying the flow noise at certain frequencies. Do not place an echo sounder transducer in the vicinity of such objects, and especially not close behind them.

For the same reason, it is very important that the hull area around the transducer face is as smooth and level as possible. Even traces of sealing compound, sharp edges, protruding bolts or bolt holes without filling compound will create noise.

Boundary water layer

When the vessel forces its way through the sea, the friction between the hull and the water creates a boundary layer. The thickness of the boundary layer depends upon vessel speed and the roughness of the hull. Objects protruding from the hull, and dents in the hull, disturb the flow and increase the thickness of the boundary layer. The flow in this boundary layer may be laminar or turbulent. A laminar flow is a nicely ordered, parallel movement of the water. A turbulent flow has a disorderly pattern, full of eddies. The boundary layer increases in thickness when the flow goes from laminar to turbulent. The figure below illustrates the boundary layer of a vessel moving through the water.



Boundary water layers:

(A) = Turbulent flow

(B) = Laminar flow

(C) = Air bubbles in the water

Furthermore, air bubbles in the sea water are pressed down below the hull and mixed into the boundary layer. The boundary layer is thin underneath the forward part of the vessel, and increases in thickness as it moves towards aft. If the sides of the hull are steep, some of the air bubbles in the boundary layer may escape to the sea surface along the vessel sides. It is our experience that a wide and flat bottom, with a rising angle less than around 13 degrees, is prone to giving air problems for the transducer. In any case a transducer location in the forward part of the hull is preferred in order to minimise the influence of the boundary layer.

Propeller noise

The propulsion propeller is the dominant noise source on most fishing vessels, research vessels, merchant vessels and pleasure crafts. The noise is transmitted through the sea water. For this reason, the transducer should be placed far away from the propeller, which means on the fore part of the hull. Positions outside the direct line of sight from the propeller are favourable. On small vessels with short distances it is advised to mount the transducer on that side of the keel where the propeller blades move upwards, because the propeller cavitation is strongest on the other side. The cavitation starts most easily when the water flows in the same direction as the propeller blade, and that is to some degree the case at that side of the keel where the propeller blades move downwards.

Bow thruster propellers are extremely noisy. When in operation, the noise and cavitation bubbles make the echo sounder useless, almost no matter where the transducer is installed. And when not in operation, the tunnel creates turbulence, and if the vessel is pitching, the tunnel may be filled with air or aerated water in the

upper position and release this in the lower position. Therefore, an echo sounder transducer should be placed well away from the bow thruster.

Inclination of the transducer face

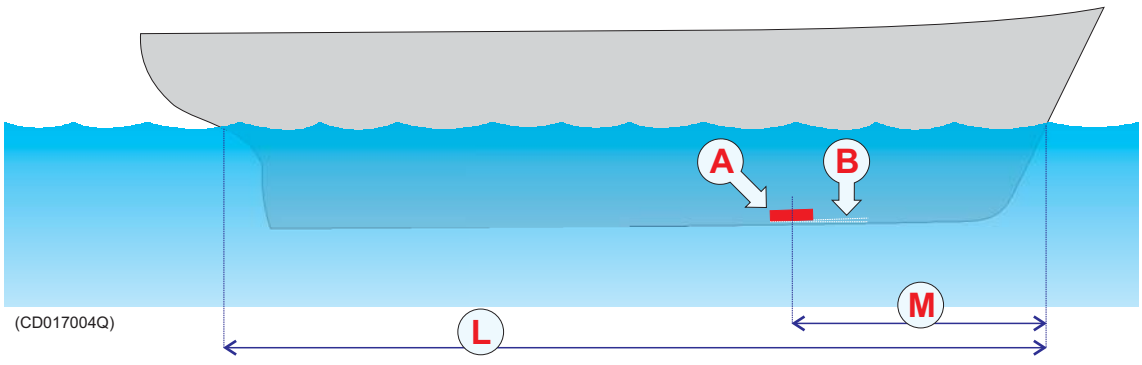
Ideally, the transducer face should be mounted in parallel with the sea surface when the vessel is in normal trim, as this will provide the most accurate echo information. However, it is also very important that the water flow over the transducer face is laminar.

In order to ensure laminar flow, the transducer face may be tilted slightly upwards in relation to the water flow. This allows the flowing water to meet the face directly, and assures laminar flow. The inclination angle must however be determined carefully. The angle must be small on transducers with narrow beam angles. As a rule of thumb, mount transducers with beam angles smaller than seven degrees with minimum inclination angle. The smaller beam angle your transducer has, the smaller the inclination angle can be.

Ensure that you do not mount the transducer with a negative inclination angle. This may cause turbulence under the transducer face, and reduced echo sounder performance.

Summary and general recommendation

Some of the above guide lines are conflicting, and each case has to be treated individually in order to find the best compromise. Generally the propeller noise is the dominant factor, and a recommended transducer location is in the fore part of the hull, with maximum distance from the bow equal to one third of the total length of the hull at the water line.



General recommendation for transducer location:

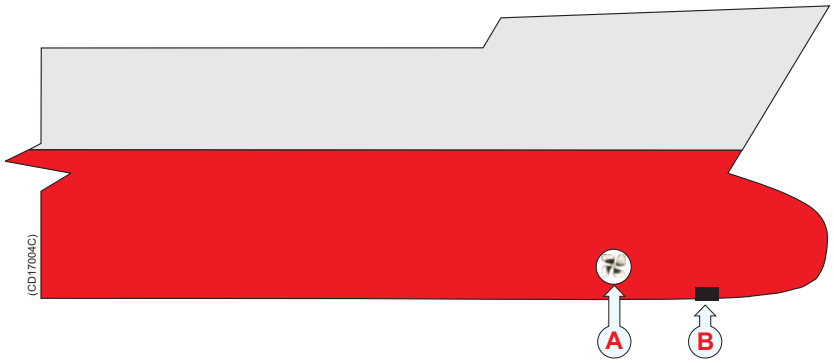
(A) = Transducer

(B) = Inclination angle

(L) = Hull length at water line

(M) = Maximum 1/3 of the hull length at water line (L)

If the vessel hull has a bulbous bow, this may well be a good transducer location, but also here must be taken into consideration the flow pattern of the aerated water. Often the foremost part of the bulb is preferable.



Recommended location of the transducer on a bulbous hull:

(A) = Thruster

(B) = Transducer location

Ways of mounting the transducer

There are many different ways to mount the transducer.

Topics

External mounting on page 115

Transducer blister on page 120

Box keel on page 126

Flush mounting in a steel tank on page 128

Acoustic window on page 130

Inside the hull on page 132

Drop keel on page 134

Retractable transducer on page 135

External mounting

Certain transducers have a streamlined housing, and these are designed for installation outside the hull.

These transducers are mainly used on smaller vessels. A location approximately 0.5 m aside from the keel may be adequate for the passage of water between the keel and the transducer. The figures illustrate external mounting of transducers on steel hulls and on wood or polyester hulls respectively.

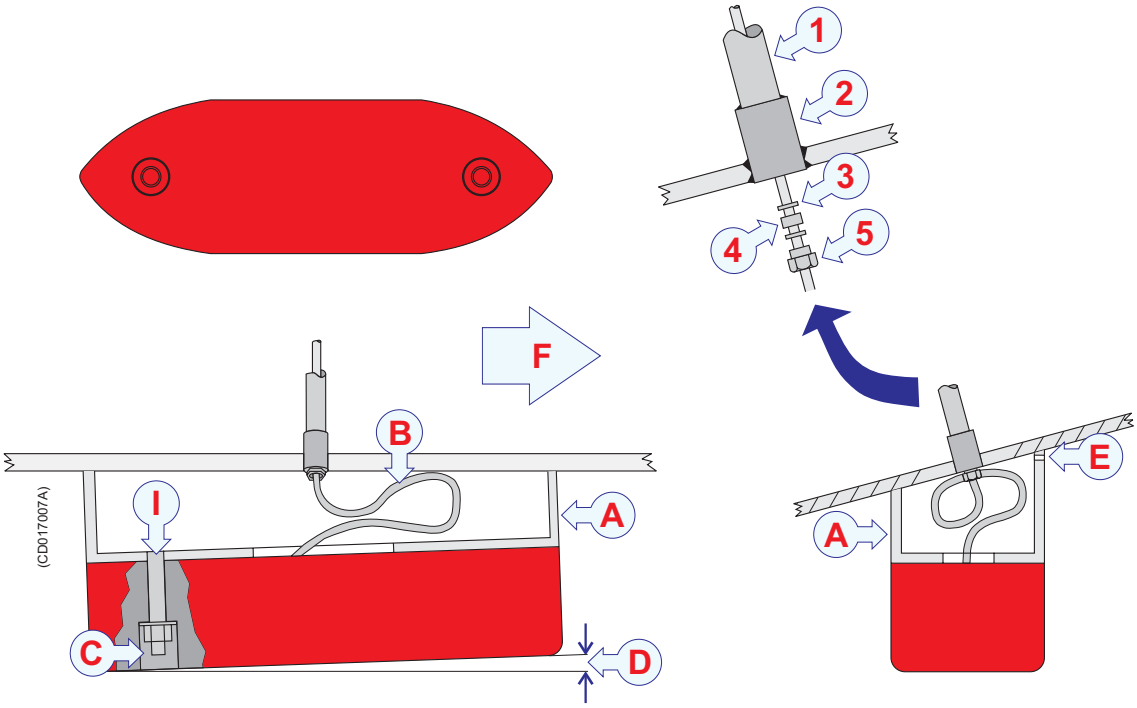
Smooth surface

Ensure that the surface of the transducer face, the hull plating and putty around the transducer is as even and smooth as possible. Obstructions on these surfaces will create problems with turbulant flow.

Mounting screws must not be extruding from the transducer, and the space around the screws must be filled with a compound (C) and/or a locking ring.

Steel hull

A fairing (A), made by the shipyard, is placed between the transducer and the hull. It is required in order to adapt for the deadrise angle of the hull, and it will also house a cable service loop (B). The fairing can be made of wood or steel, and should have the same outline dimensions as the transducer. Remember to create an air outlet (E) on the fairing, and to fill the bolt holes with a filling compound to ensure a smooth transducer surface.



(A) = Fairing

(B) = Cable service loop

(C) = Filling compound

(D) = Inclination angle

(E) = Air outlet

(F) = Forward

(I) = Threaded rod with nuts and washers, or bolt

(1) = Steel conduit

(2) = Stuffing tube

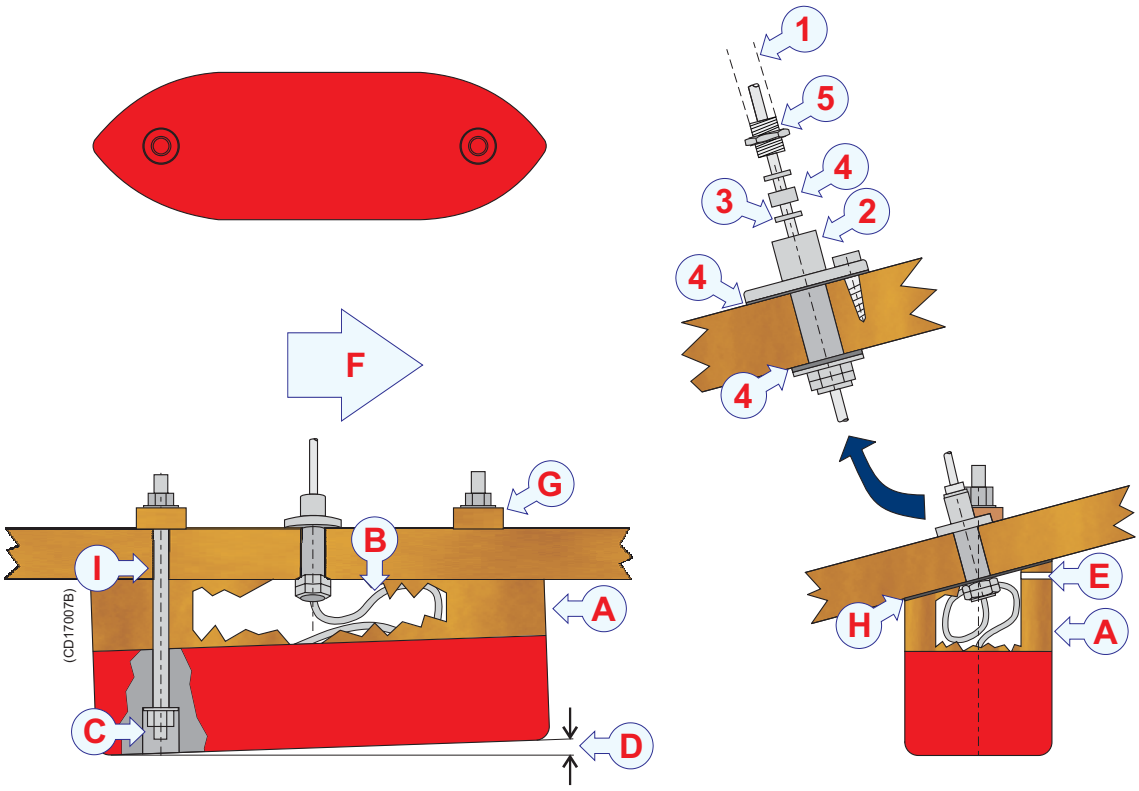
(3) = Washer

(4) = Rubber gasket

(5) = Packing nipple

Wood or polyester hull

A fairing (A), made by the shipyard, is placed between the transducer and the hull. It is required in order to adapt for the deadrise angle of the hull, and will also house a cable service loop (B). The fairing is made from wood, polyester or steel, and should have the same outline dimensions as the transducer. Use tarred felt (H) between the fairing and the hull. Remember to create an air outlet (E) on the fairing, and to fill the bolt holes with a filling compound to ensure a smooth transducer surface.



(A) = Fairing

(B) = Cable service loop

(C) = Filling compound

(D) = Inclination angle

(E) = Air outlet

(F) = Forward

(G) = Shim (wood)

(H) = Tarred felt

(I) = Threaded rod with nuts and washers, or bolt

(1) = Steel conduit

(2) = Stuffing tube

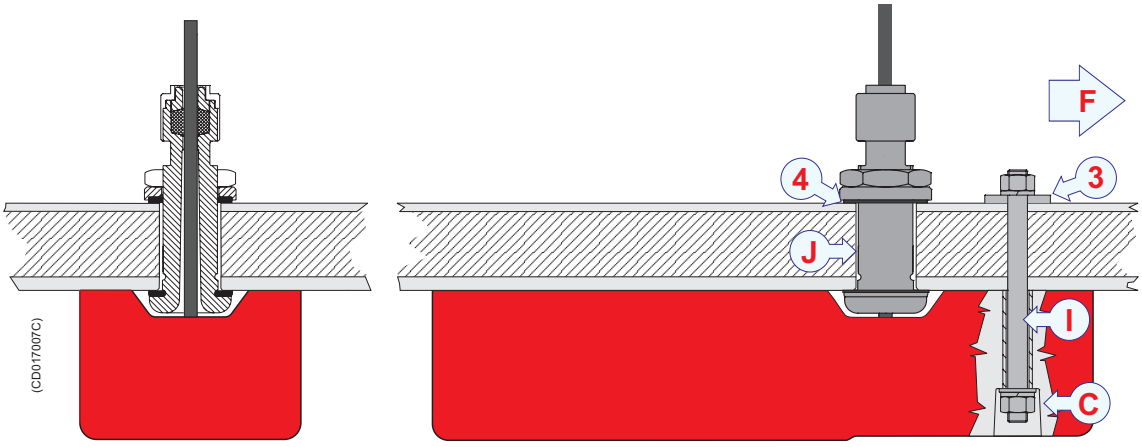
(3) = Washer

(4) = Rubber gasket

(5) = Packing nipple

Hull with flat bottom

If the vessel's hull is flat you do not need a fairing. The transducer is then be bolted directly to the hull using two bronze or stainless steel bolts (I) and a cable bushing. Note that the cable bushing must be mounted with proper gaskets (4) under and over the hull, as well as sealing compound (J) around its body. Also, fill the bolt holes with a filling compound to ensure a smooth transducer surface.



(C) = Filling compound

(F) = Forward

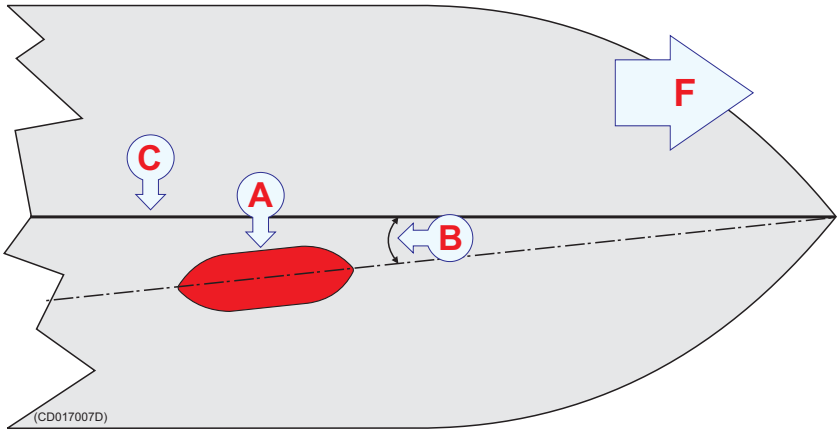
(I) = Threaded rod with nuts and washers, or bolt

(3) = Washer

(4) = Rubber gasket

Toe-in

The primary consideration must be to allow laminar water flow. In most cases this is achieved by placing the transducer (A) parallel with the keel (C). However, if the transducer is located close to the bow, the front of the transducer may have a few degrees (5 to 8°) toe-in towards the bow. If you have a planing hull, the toe-in must be 0°.



(A) = Transducer

(B) = 5 to 8° on deplacement hulls, 0° on planing hulls

(C) = Keel

(F) = Forward

Transducer blister

With a transducer with circular housing, one recommended installation method is by using a blister. The transducer blister must be designed and manufactured by the installation shipyard to fit the vessel's size and hull shape.

Mounting and clamping rings

Circular transducers may be provided with mounting and clamping rings, or with drawings to allow for local production of these. The mounting ring is welded to the hole in the transducer blister, while the clamping ring fits around the edge of the transducer body. Bolts through the clamping ring into the mounting ring will then secure the transducer between them. Note that several transducers use direction guides to allow correct mounting.

Smooth surface

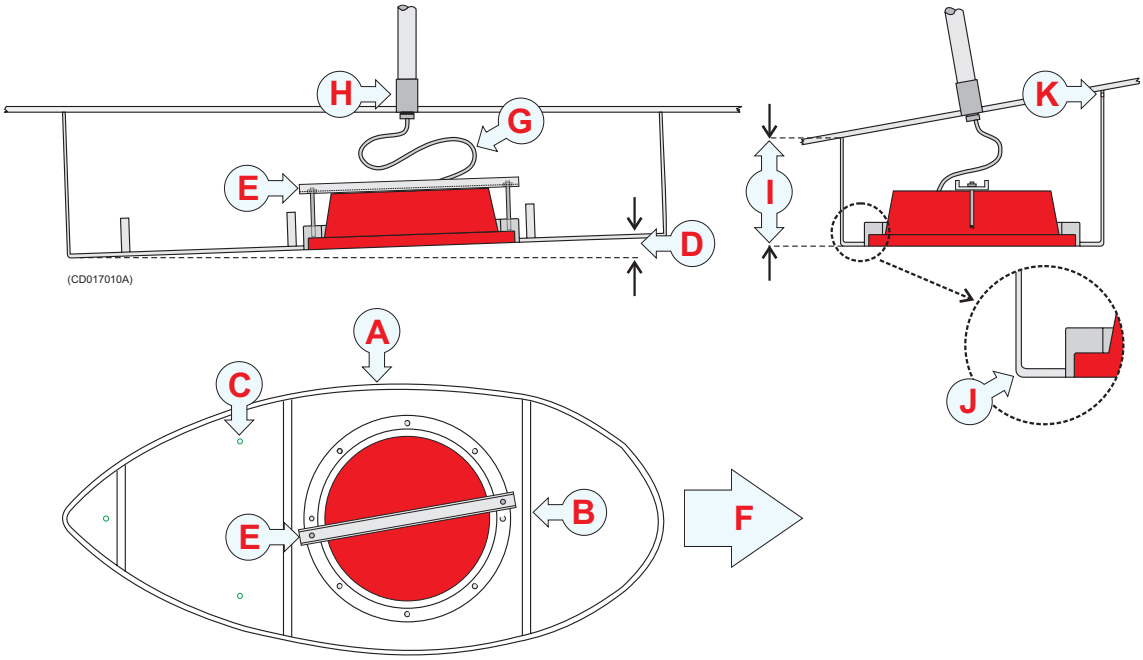
Mounting screws or bolts must not be extruding from the transducer blister. Ensure that the surface of the transducer face, the blister, the hull plating and putty around the transducer is as even and smooth as possible. Obstructions on these surfaces will create problems with turbulant flow.

Horizontal support bar

Large diameter transducers must be fitted with a horizontal support bar. This bar can be secured to the mounting ring using threaded rods.

Example: Large transducer

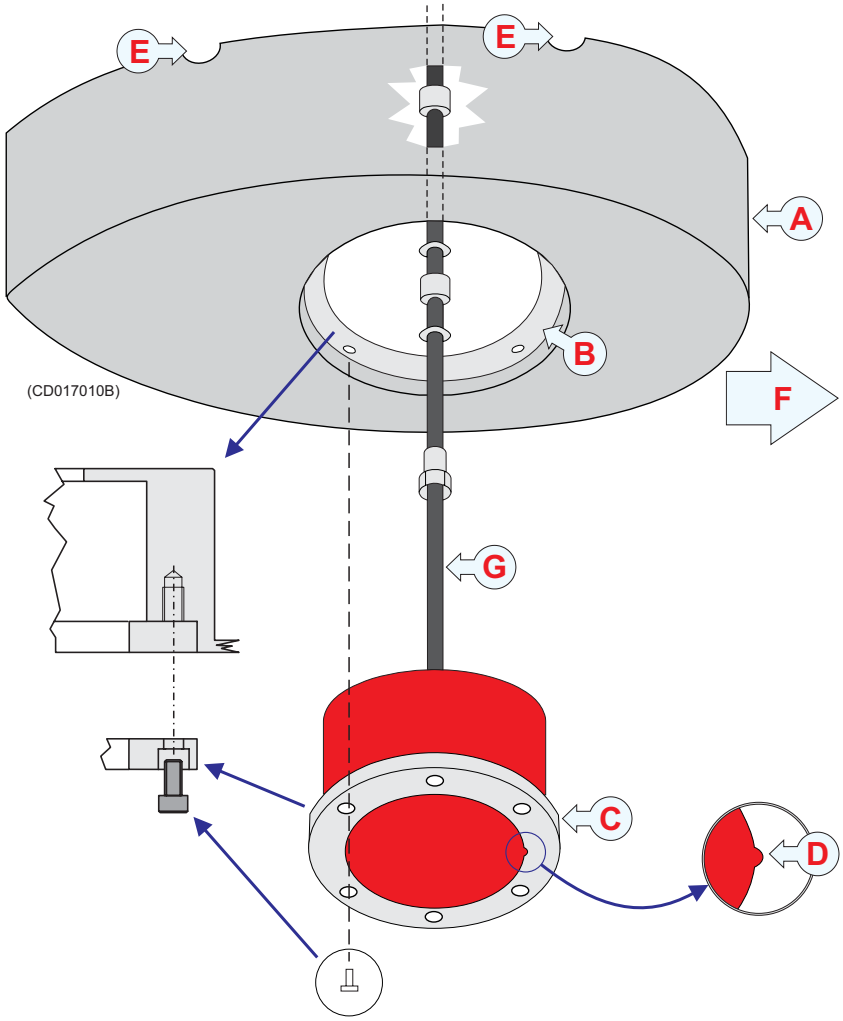
The illustration below shows a typical transducer blister designed for a large transducer. Note that due to the physical size of the transducer, a U-shaped support bar (E) is used to support the transducer. The purpose of this support is to prevent the transducer from being pushed up into the blister in heavy seas.



(A) = Streamlined blister
(B) = Stiffening rib
(C) = Drainage holes
(D) = Inclination angle
(E) = U-shaped support bar
(F) = Forward
(G) = Cable service loop
(H) = Stuffing tube
(I) = Minimum 400 mm
(J) = Rounded corners
(K) = Air outlet

Example: Small transducer

The illustration below shows a typical transducer blister designed for a small transducer. The same blister design principles as for a large transducer apply.

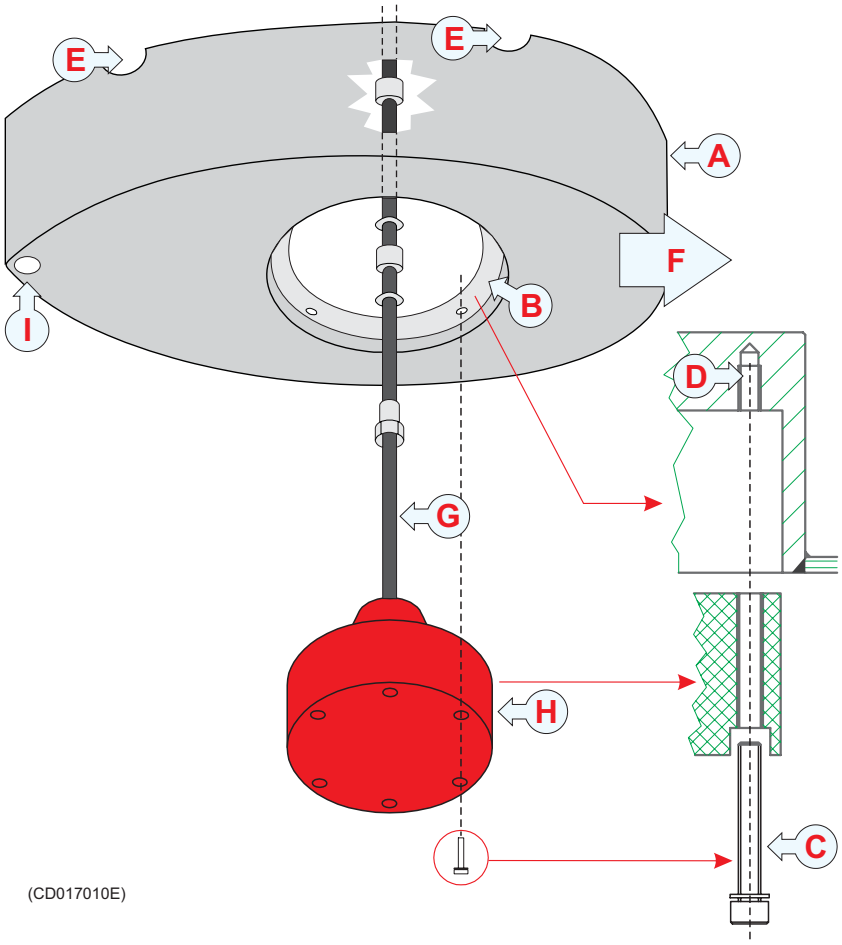


(A) = Streamlined blister
(B) = Mounting ring
(C) = Clamping ring
(D) = Guide
(E) = Air outlet
(F) = Forward
(G) = Transducer cable

Note that the transducer cable must be provided with a cable loop inside the blister. Observe the vertical forward edge of the blister. This will guide the water to each side of the blister.

Example: Medium sized transducer without clamping ring

The illustration below shows a transducer blister designed for a medium sized transducers. The same blister design principles apply. Note that the transducer is mounted without a clamping ring, which makes it necessary to use a different mounting ring design.



(A) = Streamlined blister
(B) = Mounting ring
(C) = Bolt
(D) = Self-locking threads
(E) = Air outlet
(F) = Forward
(G) = Transducer cable
(H) = Transducer

Note that the transducer cable must be provided with a cable loop inside the blister. Observe the vertical forward edge of the blister. This will guide the water to each side of the blister.

Common guidelines

The best performance is obtained with a blister height of 40 cm or more. A streamlined shape and rounded edges reduce the flow noise. A vertical leading edge or front will guide the aerated water to the sides of the blister. The orientation of the blister should follow the water flow.

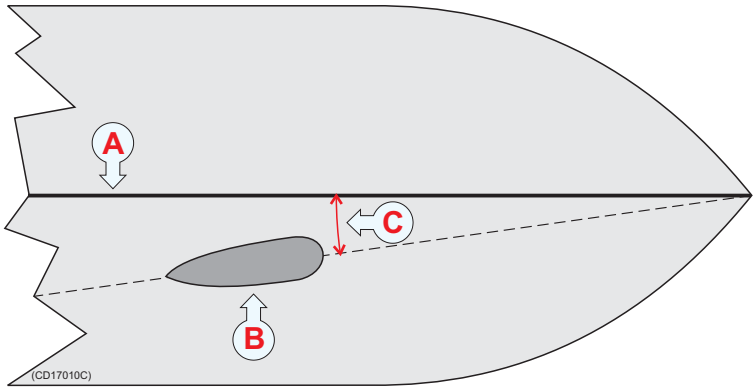
The interior of the blister must be filled with sea water. Use drainage holes in the bottom and an air outlet on the top. The water pressure behind the transducer will then compensate for the outside pressure during vessel movements in rough sea.

Large diameter transducers must be fitted with a horizontal U-shaped support bar. This bar can then be secured to the mounting ring using threaded rods.

The transducer cable penetrates the hull in a stuffing tube. Leave an adequate loop of the cable behind the transducer for easy mounting or removal of the transducer.

Toe-in

The primary consideration must be to allow laminar water flow. In most cases this is achieved by designing the blister in parallel with the keel. However, if the blister is located close to the bow, the front of the blister may have a few degrees toe-in towards the bow.



(A) = Keel

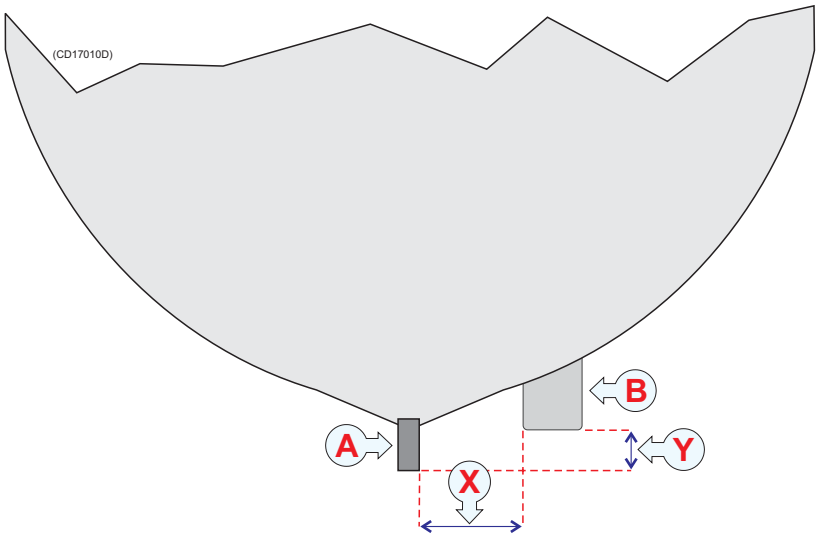
(B) = Blister

(C) = Toe-in angle

Physical location

The blister is placed on one of the sides of the hull, and the distance from the keel is a trade off between a close distance giving a turbulent flow of water in a narrow passage, and a large distance bringing the transducer higher up and also more affected by vessel roll. Normally a distance of approximately 1 m is a good compromise.

Observe the horizontal and vertical distances (X and Y) between the keel and the transducer blister. On a medium sized vessel, the horizontal distance (X) should be approximately 1 meter. The vertical distance (Y) must in general be as small as possible. This is important to prevent the keel from shadowing the transducer beam in shallow waters.



(A) = Keel

(B) = Transducer blister

(X) = Horizontal distance between keel and blister

(Y) = Vertical distance between the blister surface and the keel

Box keel

Vessels with a box keel may use this for transducer installation.

The box keel is already the deepest part of the vessel. If the box keel is too narrow to accommodate the transducer, it can be widened, either symmetrically or to one side only. In the last case the installation could also be described as a blister merged into the keel.

Mounting and clamping rings

Circular transducers may be provided with mounting and clamping rings, or with drawings to allow for local production of these. The mounting ring is welded to the hole in the box keel, while the clamping ring fits around the edge of the transducer body. Bolts through the clamping ring into the mounting ring will then secure the transducer between them. Note that several transducers use direction guides to allow correct mounting.

Smooth surface

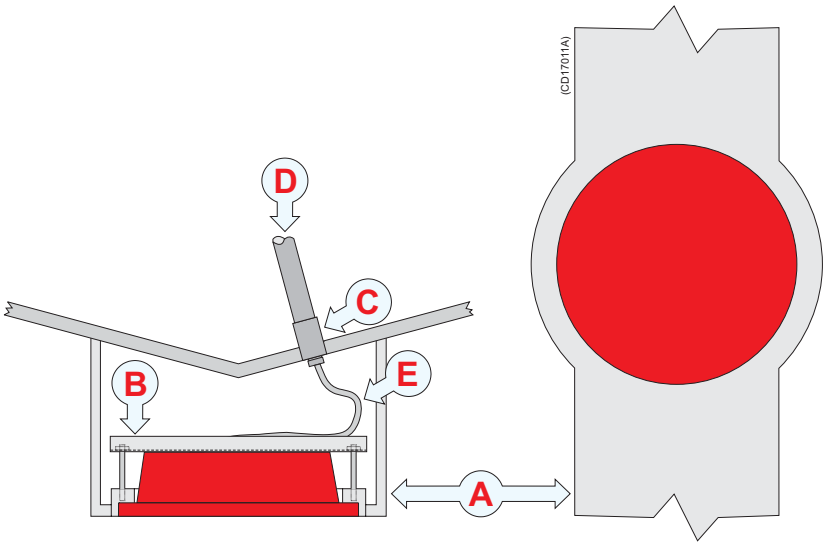
Mounting screws or bolts must not be extruding from the box keel. Ensure that the surface of the transducer face, the box, the hull plating and putty around the transducer is as even and smooth as possible. Obstructions on these surfaces will create problems with turbulant flow.

Horizontal support bar

Large diameter transducers must be fitted with a horizontal support bar. This bar can be secured to the mounting ring using threaded rods.

Example

The figure below illustrates a symmetrical box keel installation.



(A) = Box keel

(B) = U-shaped support bar (only required on large transducers)

(C) = Stuffing tube

(D) = Cable in steel conduit

(E) = Cable service loop

Flush mounting in a steel tank

Flush mounting is used on very large vessels with a hull so deep that no air bubbles are found below the hull, and on vessels operating in shallow harbours or waters, where a protruding blister can not be accepted.

The standard procedure for flush mounting on a steel vessel is to weld a steel tank inside the hull, and mount the transducer into this tank.

Mounting and clamping rings

Circular transducers may be provided with mounting and clamping rings, or with drawings to allow for local production of these. The mounting ring is welded to the hole in the hull plating, while the clamping ring fits around the edge of the transducer body. Bolts through the clamping ring into the mounting ring will then secure the transducer between them. Note that several transducers use direction guides to allow correct mounting.

Smooth surface

Mounting screws or bolts must not be extruding from the hull plating. Ensure that the surface of the transducer face, the hull plating and putty around the transducer is as even and smooth as possible. Obstructions on these surfaces will create problems with turbulant flow.

Horizontal support bar

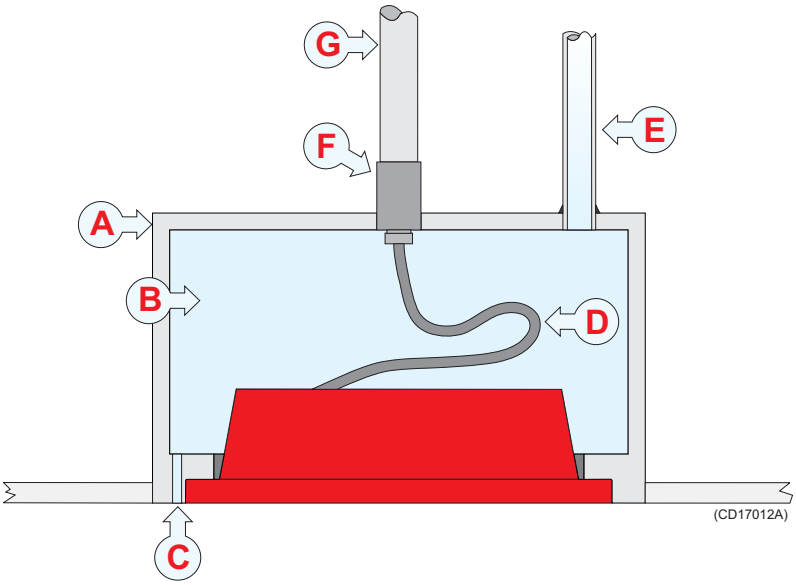
Large diameter transducers must be fitted with a horizontal support bar. This bar can be secured to the mounting ring using threaded rods.

Water filled

As for a blister, the interior of the tank must be filled with water. This can be accomplished by air release through a steel tube, which is extended either to open air 1.5 m above the water line or to the water outside the hull at a point higher than the tank interior. If the tube is extended to open air, drainage must be provided with leakage at the transducer flange or a separate hole in the tank bottom.

Example

Transducer mounting in a steel tank is shown in the figure below.



(A) = Steel tank

(B) = Water

(C) = Drainage hole

(D) = Cable service loop

(E) = Steel tube for air outlet

(F) = Stuffing tube

(G) = Cable in steel conduit

Acoustic window

Vessels operating in arctic waters need special attention on transducer installation. Floating blocks of ice may damage even a flush mounted transducer face. For this situation Simrad offers arctic tanks in different sizes.

Mounting and clamping rings

Circular transducers may be provided with mounting and clamping rings, or with drawings to allow for local production of these. The mounting ring is welded to the hole inside the steel tank, while the clamping ring fits around the edge of the transducer body. Bolts through the clamping ring into the mounting ring will then secure the transducer between them. Note that several transducers use direction guides to allow correct mounting.

Smooth surface

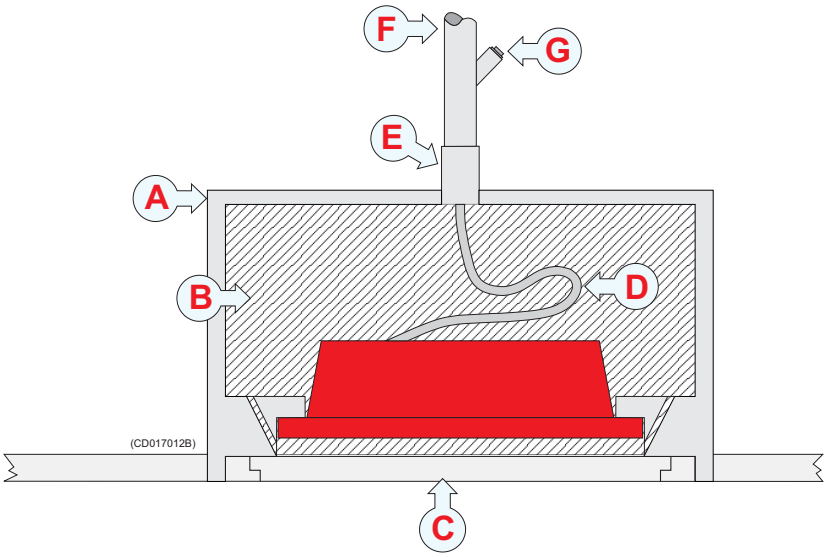
Mounting screws or bolts must not be extruding from the acoustic window. Ensure that the surface of the window, the hull plating and putty around the transducer is as even and smooth as possible. Obstructions on these surfaces will create problems with turbulant flow.

Horizontal support bar

Large diameter transducers must be fitted with a horizontal support bar. This bar can be secured to the mounting ring using threaded rods.

Example

The transducer shown in the figure below is mounted inside the tank behind a strong acoustic window which could be made of polycarbonate. The tank is filled with oil.



(A) = Steel tank

(B) = Oil

(C) = Acoustic window

(D) = Cable service loop

(E) = Stuffing tube

(F) = Cable in steel conduit

(G) = Oil inlet

Inside the hull

The transducer can also be mounted inside the hull.

An installation of the transducer inside the hull, and sounding through the hull, requires a good acoustic contact between the transducer face and the hull. Build a tank around the transducer and fill it with a liquid. Oil used in hydraulic systems is a well suited liquid for this purpose. It contains no gas bubbles and is non-corrosive.

Typical values of the two way loss are 3 dB for polyester, 6 dB for aluminium and 10 dB for steel. Hulls made of wood or a sandwich type with foam in the middle, attenuate the sound so much that through hull sounding must be regarded as impossible. The loss varies with the distance between transducer face and the hull. The best result is obtained when the distance is half a wavelength. Consult Simrad for advice. In addition to the loss, the beam pattern is degraded, because a larger area of the hull is set into vibrations.

Mounting and clamping rings

Circular transducers may be provided with mounting and clamping rings, or with drawings to allow for local production of these. The mounting ring is welded to the hole inside the steel tank, while the clamping ring fits around the edge of the transducer body. Bolts through the clamping ring into the mounting ring will then secure the transducer between them. Note that several transducers use direction guides to allow correct mounting.

Smooth surface

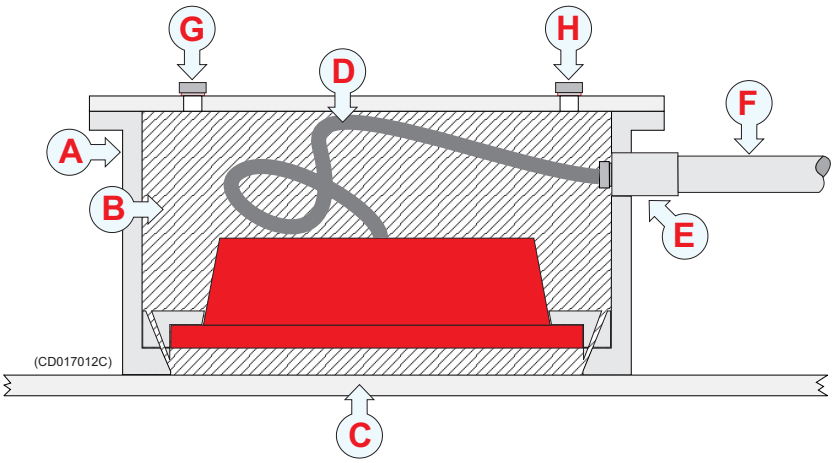
Mounting screws or bolts must not be extruding from the acoustic window. Ensure that the surface of the window, the hull plating and putty around the transducer is as even and smooth as possible. Obstructions on these surfaces will create problems with turbulant flow.

Horizontal support bar

Large diameter transducers must be fitted with a horizontal support bar. This bar can be secured to the mounting ring using threaded rods.

Example

The transducer shown in the figure below is mounted inside the hull. The tank is filled with oil.



(A) = Steel tank

(B) = Oil

(C) = Hull plating

(D) = Cable service loop

(E) = Stuffing tube

(F) = Cable in steel conduit

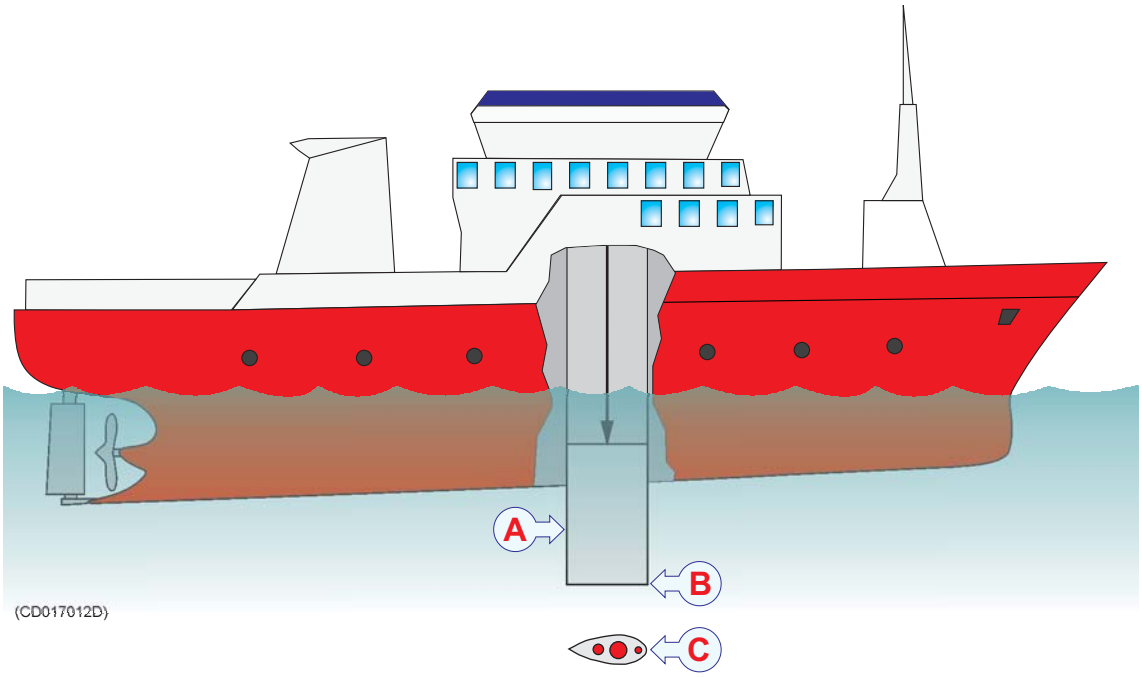
(G) = Hole for oil filling

(H) = Air outlet

Drop keel

The use of a drop keel with the purpose of stabilising the vessel is well known.

A drop keel is also a superior platform for echo sounder transducers. Such instrument keels have been built, mainly on research vessels, often protruding as far as three meters below the hull. At that depth, the water is free of air bubbles up to very high sea states. The vessel is then able to perform reliable acoustic measurements in open sea a larger part of the year.



(A) = Instrument keel shaft

(B) = Lowered position

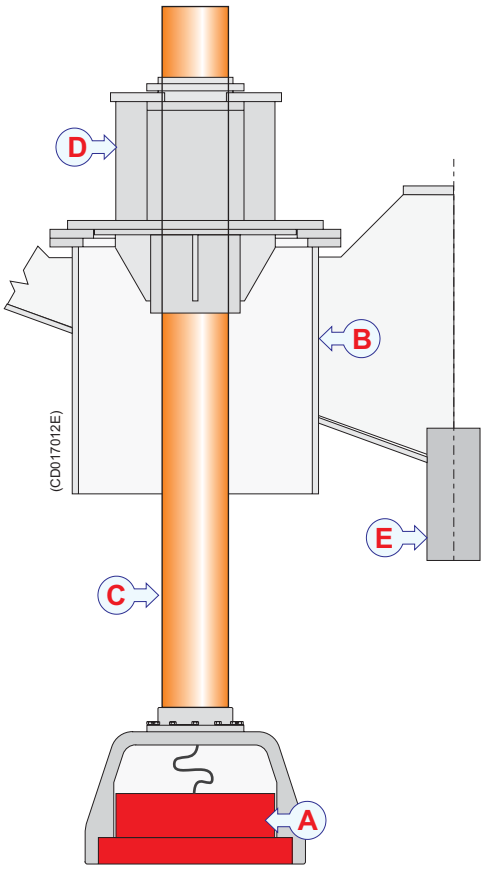
(C) = Bottom view

Retractable transducer

Hull units allowing the transducer to be lowered and hoisted are commonly used for horizontal looking sonars. When not in use, the transducer is retracted into a trunk.

The retractable hull unit is more expensive than a blister, but on vessels with a hull where it is difficult or impossible to install a blister, it may still be worth while. The principles of a hull unit with a retractable transducer is shown below.

Vessels without a keel and with a wide, flat bottom is an example where a retractable hull unit can be the only acceptable method for bringing the echo sounder transducer below the boundary layer.



(A) = Transducer

(B) = Trunk

(C) = Transducer shaft

(D) = Transducer shaft sleeve

(E) = Keel

Cable glands

The transducer cable must pass through the hull using approved cable glands for the type of vessel in question.

A **steel** cable gland is normally used on professional vessels with steel hulls. A **bronze** cable gland can be delivered as an option for vessels with wood or fibreglass hulls. Vessel not to be classified can as an option use a cable gland made of **plastic**.

Note

Simrad strongly recommends that a length of conduit is fitted around transducer cable glands made of steel or bronze and extended over the water-line inside the vessel. This precaution reduces the danger of flooding in the event of gland failure and transducers installed in this manner are also easier to replace.

Some vessels may experience difficulties finding suitable areas of the hull for mounting transducer cable glands due to existing water tanks, concrete ballast or other obstacles. A possible solution in such cases is to run the transducer cables in a steel conduit aft along the hull until a suitable cable gland location is available. The respective cable gland can then be installed as described in the following instructions.

Note

Simrad takes no responsibility for the correct installation of cable glands, associated hull modifications and/or structural support of transducer cable penetration. These activities are subject to individual approval by the respective classification society for the vessel in question.

Order numbers

The cable glands described in this chapter are available as kits from Simrad. Observe the following order numbers.

Steel hull cable gland kit (steel, 8 to 15 mm cables): 599-202216

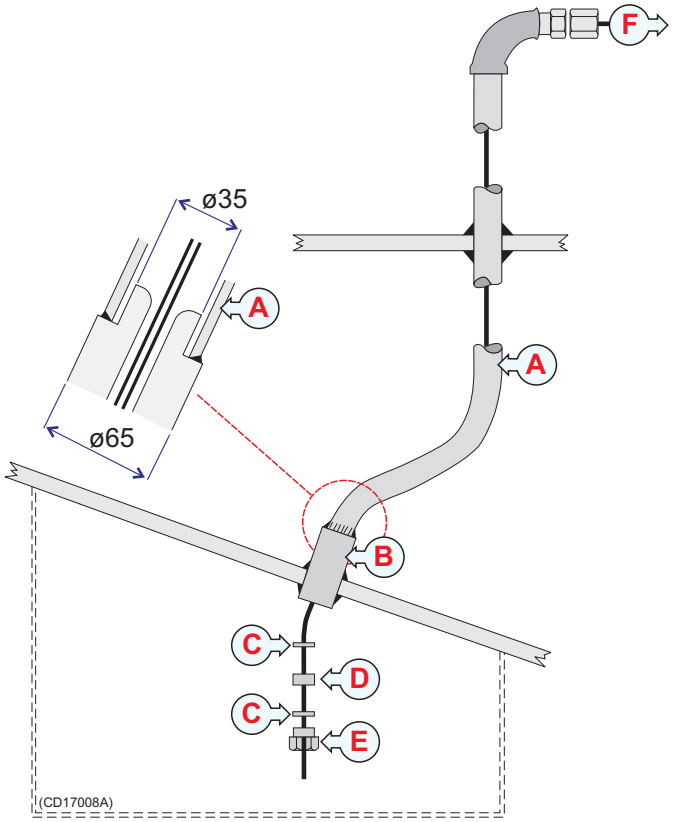
Steel hull cable gland kit (steel, 17 to 18,5 mm cables): 305609

Wood/GRP hull cable gland kit (bronze): 119-038200

Small hull cable gland kit (plastic): 599-202182

Cable gland for steel hulls

This cable gland kit is designed for steel vessels. It must be welded to the hull plates.



(A) = Steel conduit

(B) = Stuffing tube, DNV approved carbon steel st52.3

(C) = Washers

(D) = Rubber gasket

(E) = Packing nipple. Make sure that you do not damage the transducer cable by tightening the packing nipple too hard!

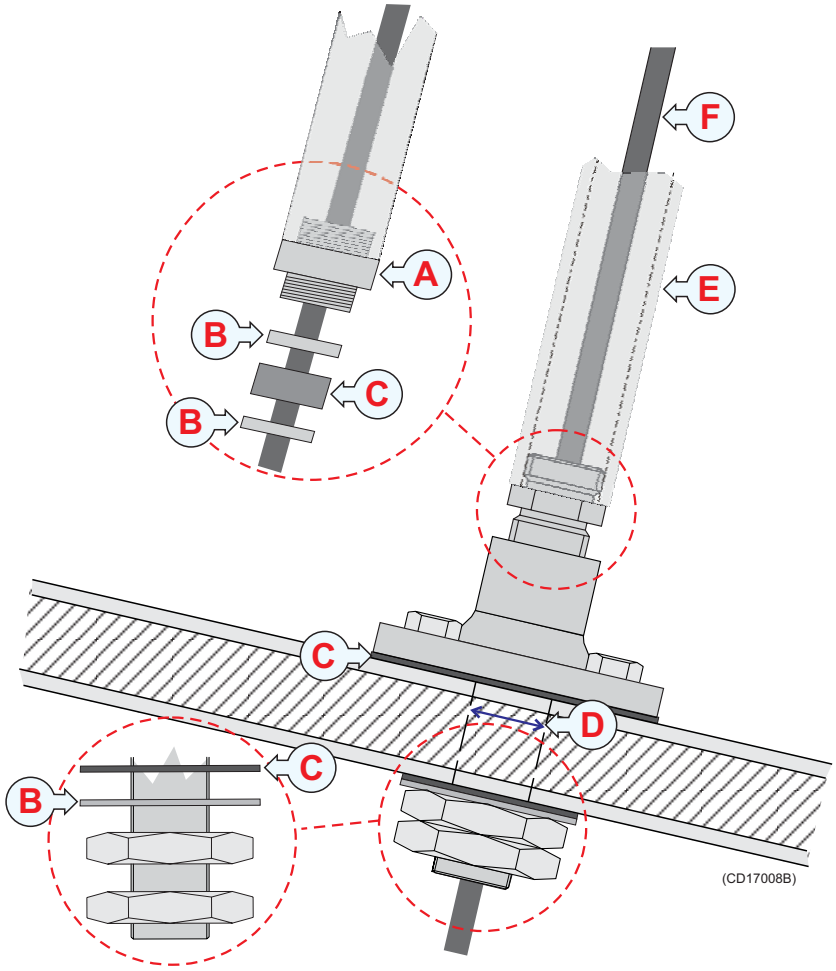
(F) = Cable to the echo sounder (or a junction box)

The cable gland kit includes all of the necessary parts needed to install the unit except screws.

Simrad recommends that a one inch steel conduit (that the transducer cable will be run through) with an inside threaded diameter of three-quarter inches is welded to the gland's stuffing tube. The conduit must extend to above the vessel's water line.

Cable gland for wood or GRP hulls

A bronze cable gland kit is available for wood and GRP vessels.



(A) = Packing nipple. Make sure that you do not damage the transducer cable by tightening the packing nipple too hard!

(B) = Washers

(C) = Rubber gaskets

(D) = Hole diameter 28 mm

(E) = Steel conduit

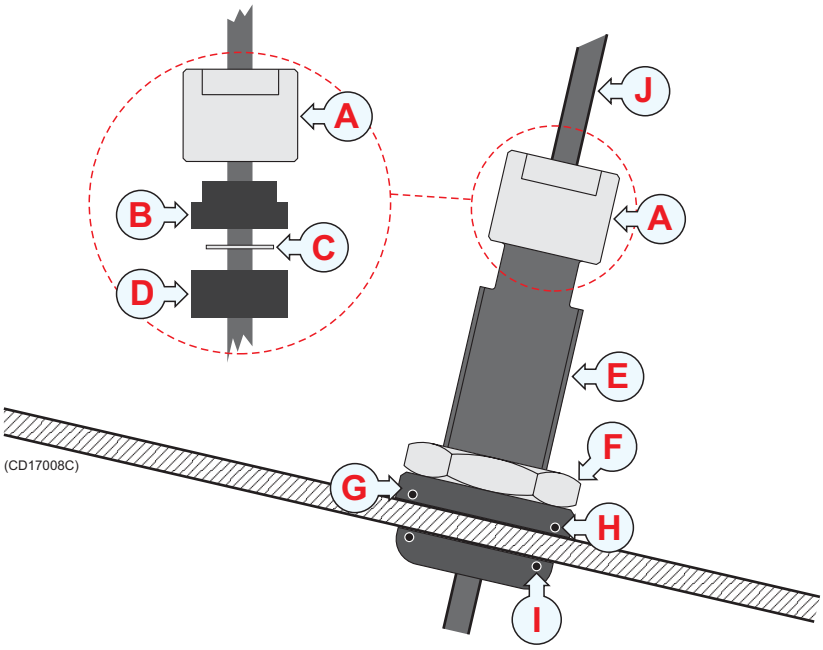
(F) = Cable to the echo sounder (or a junction box)

The cable gland kit includes all of the necessary parts needed to install the unit except screws.

Simrad recommends that a one inch steel conduit (that the transducer cable will be run through) with an inside threaded diameter of three-quarter inches is attached to the gland's packing nipple. This connection must be watertight, and the conduit must extend to above the vessel's water line.

Cable glands for small hulls

This cable glands made of plastic is designed for those smaller vessels that do not need to be classified.



(A) = Packing nut (bronze). Ensure that you do not to damage the transducer cable by tightening the packing nut too hard!

(B) = Rubber gasket

(C) = Plastic disk

(D) = Rubber gasket

(E) = Stuffing tube

(F) = Backing nut (bronze)

(G) = Backing washer (plastic)

(H) = O-ring 42.5 x 3.0 N

(I) = O-ring 39.5 x 3.0 N

(J) = Cable to the echo sounder (or a junction box)

Stuffing tube hole diameter: 36 mm ±1.5 mm.

Apply ample amount of sealant between the backing washer (H) and the hull plate.

The cable gland kit contains all the listed parts, except the sealant.

Note

The two O-rings must be clean, in good condition and free of cuts or other defects which could affect their watertight integrity.

Cable splicing

If you need to cut or lengthen the transducer cable, you must splice it correctly. The cable between the junction box and the transceiver must then be supplied by Simrad, and this must be the same type as used on the transducer(s).

Note

Do not solder the wires together with only electrical tape for insulation, as this will result in electrical noise and reduced operational performance.

To splice the cable, use a metal junction box with EMC cable glands and a terminal block. The terminal block must provide solid fastening of the cable ends as well as sufficient insulation between the wires.

Note

We recommend that the cable screen is connected to the junction box chassis using the EMC cable glands, but if you do this, the junction box chassis must not be connected to ship's ground.

The cable screen must not be connected to the ship's ground through the junction box.

Steel conduit

It is strongly recommended to lay a steel conduit from the transducer's cable gland to the echo sounder transceiver, and to pull the transducer cable through this conduit. There are two reasons for this.

- First, it will make it easier at a later stage to replace the transducer.
- Second, noise and interference from other electrical equipment is greatly reduced.

With a steel conduit the installation will satisfy the EU regulations for EMC interference. Without a steel conduit, there is a risk of reduced echo sounder performance.

The steel conduit must be unbroken and watertight from the transducer to above the water line. From there, the cable can be pulled further, or a junction box can be installed to facilitate further connections. Note that the steel conduit must act as a continuous electrical screen all the way. To ensure proper shielding, the conduit must be electrically connected to the echo sounder transceiver chassis.

Steel conduit dimensions:

- minimum 35 mm inner diameter

- minimum 6 mm wall thickness (4.5 mm if galvanised)

If two or more transducers are installed close to each other it is possible to pull their cables in the same steel conduit, provided the conduit diameter is increased accordingly. However, for easy replacement it is recommended that each transducer has its own steel conduit.

Handling and maintenance

Note

***Do not** lift the transducer by the cable.*

***Do not** expose the transducer to direct sunlight.*

***Do not** expose the transducer to excessive heat.*

Some transducers are delivered with a cover plate on the face for protection during transport. Let this plate stay on as long as possible, but do not forget to remove it before the vessel goes into the sea.

An anti-fouling paint may be applied to the transducer face. Because some paint types may be aggressive to the polyurethane in the transducer face, please consult Simrad's list of approved paints.

Note

Arctic tanks have acoustic windows made of polycarbonate. These must neither be painted nor cleaned with chemicals.

During dry docking of the vessel, the transducer face may be cleaned for shells and other marine fouling. Be careful not to make cuts in the transducer face. Use a piece of wood or a very fine grade emery paper.

Approved anti-fouling paints

This is Simrad's list of approved antifouling paints on polyurethane transducer housing.

Jotun

Head office address: P.O.Box 2021, N-3248 Sandefjord, Norway

Website: www.jotun.com.

1 Racing

2 Non-stop

3 Safeguard Universal primer (125 micron) with Antifouling SeaQuantum Ultra (125 micron)

4 Antifouling Seaguardian

International Marine Coatings

Address: World-wide offices

Wesite: www.international-marine.com.

1 Intersleek tie coat + 425 FCS

- BXA386/BXA390/BXA391 Grey
- HKA563/HKA570/HKA571 Yellow
- Mix BXA386, BXA390 and BXA391 first, then apply. When dry, mix HKA563, HKA570 and HKA571, apply.

2 Intersmooth 360 Ecoloflex SPC

3 Micron Ekstra

Hempel IFA Coatings

Head office address: Hempel A/S, Lundtoftevej 150, Kgs. Lyngby, DK-2800 Copenhagen, Denmark

Website: www.hempel.com.

1 Hempel A/F Classic 76550

Note

Refer to the manufacturer's documentation and data sheets for a complete procedure.

SIMRAD TRANSDUCERS

This chapter presents a list of all the current Simrad transducers. For each transducer, information is provided to establish:

- the transducer type and frequency
- the opening angle(s)
- the order number for the transducer
- the order number for the transducer cable
- how it is connected to the General Purpose Transceiver (GPT) unit

This list was correct at the time of writing. However, new transducers are frequently added to the product range. For an updated list of all the currently available transducers, refer to www.simrad.com. Product specifications and installation documents can be downloaded from the web site.

Topics

All 12 kHz transducers on page 144

All 18 kHz transducers on page 144

All 27 kHz transducers on page 144

All 38 kHz transducers on page 145

All 50 kHz transducers on page 147

All 70 khz transducers on page 148

All 120 khz transducers on page 149

All 200 kHz transducers on page 150

All 710 kHz transducers on page 152

Related topics

Cable splicing on page 140

GPT Transducer plug connection on page 105

All 12 kHz transducers

The following 12 kHz transducers are available.

Simrad 12-16/60

- **Type and frequency:** Single or dual beam, 12 kHz
- **Opening angle:** 16° or 60° (Passive)
- **Typical applications:** Fish finding, hydrographic and scientific echo sounders
- **Order number, transducer:** KSV-089510
- **Order number, transducer cable:** 642-022491
- **GPT connection:** *12-16/60 transducer* on page 77

All 18 kHz transducers

The following 18 kHz transducers are available.

Simrad 18–11

- **Type and frequency:** Single beam, 18 kHz
- **Opening angle:** 11°
- **Typical applications:** Fish finding and hydrographic echo sounders
- **Order number, transducer:** KSV-088693
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad ES18

- **Type and frequency:** Split beam, 18 kHz
- **Opening angle:** 11°
- **Typical applications:** Fish finding and scientific echo sounders
- **Order number, transducer:** KSV-088694
- **Order number, transducer cable:** 642–075072
- **GPT connection:** *Split beam transducer* on page 71

All 27 kHz transducers

The following 27 kHz transducers are available.

Simrad 27-26/21

- **Type and frequency:** Dual beam, 27 kHz
- **Opening angle:** 10 x 11° or 10 x 20°
- **Typical applications:** Fish finding and hydrographic echo sounders

- **Order number, transducer:** KSV-067159
- **Order number, transducer cable:** 642-022491
- **GPT connection:** *Dual beam (wide or narrow) transducer* on page 70

All 38 kHz transducers

The following 38 kHz transducers are available.

Simrad 38-7

- **Type and frequency:** Single beam, 38 kHz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and hydrographic echo sounders
- **Order number, transducer:** KSV-082776
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad 38-9

- **Type and frequency:** Single beam, 38 kHz
- **Opening angle:** 9°
- **Typical applications:** Fish finding and hydrographic echo sounders
- **Order number, transducer:** KSV-203635
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad ES38-10

- **Type and frequency:** Split beam, 38 kHz
- **Opening angle:** 10°
- **Typical applications:** Fish finding echo sounders
- **Order number, transducer:** KSV-202714
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *ES38–10 transducer* on page 76

Simrad ES38-12

- **Type and frequency:** Split beam, 38 kHz
- **Opening angle:** 12°
- **Typical applications:** Fish finding and scientific echo sounders
- **Order number, transducer:** KSV-111497

- **Order number, transducer cable:** 642-078215
- **GPT connection:** *Split beam transducer* on page 71

Simrad ES38B

- **Type and frequency:** Split beam, 38 kHz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and scientific echo sounders
- **Order number, transducer:** KSV-074531
- **Order number, transducer cable:** 642-075072
- **GPT connection:** *Split beam transducer* on page 71

Simrad ES38DD

- **Type and frequency:** Split beam, 38 kHz
- **Opening angle:** 7°
- **Typical applications:** Scientific echo sounders, towed array
- **Order number, transducer:** KSV-113392
- **Order number, transducer cable:** Shipyard supply
- **GPT connection:** *Deep water, split beam transducer* on page 75

Simrad 38/200 Combi C

- **Type and frequency:** Dual frequency single beam, 38 and 200 kHz
- **Opening angle:** 13 x 21° and 7 x 7°
- **Typical applications:** Fish finding echo sounders, Catch monitoring systems
- **Order number, transducer:** KSV-202192
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *38/200 Combi C transducer* on page 79

Simrad 38/200 Combi D

- **Type and frequency:** Dual frequency single beam, 38 and 200 kHz
- **Opening angle:** 13 x 21° and 7 x 7°
- **Typical applications:** Fish finding and hydrographic echo sounders, Catch monitoring systems
- **Order number, transducer:** KSV-203004
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *Dual frequency, single beam transducer* on page 74

Simrad 38/200 Combi W

- **Type and frequency:** Dual frequency single beam, 38 and 200 kHz
- **Opening angle:** 31 x 31° and 31 x 31°
- **Typical applications:** Fish finding echo sounders
- **Order number, transducer:** KSV-208845
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *Dual frequency, single beam transducer* on page 74

All 50 kHz transducers

The following 50 kHz transducers are available.

Simrad 50-7

- **Type and frequency:** Single beam, 50 kHz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and hydrographic echo sounders
- **Order number, transducer:** KSV-203665
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad 50-18

- **Type and frequency:** Single beam, 50 kHz
- **Opening angle:** 18°
- **Typical applications:** Hydrographic echo sounders
- **Order number, transducer:** KSV-082606
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad 50-18POR

- **Type and frequency:** Single beam, 50 kHz, Portable
- **Opening angle:** 18°
- **Typical applications:** Hydrographic echo sounders, portable
- **Order number, transducer:** KSV-088073
- **Order number, transducer cable:**
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad 50/200 Combi C

- **Type and frequency:** Dual frequency single beam, 50 and 200 kHz
- **Opening angles:** 10 x 16° and 7 x 7°
- **Typical applications:** Fish finding echo sounders, Catch monitoring systems
- **Order number, transducer:** KSV-202193
- **Order number, transducer cable:** 642–078215
- **GPT connection:** *50/200 Combi C transducer* on page 78

Simrad 50/200 Combi D

- **Type and frequency:** Dual frequency single beam, 50 and 200 kHz
- **Opening angles:** 10 x 16° and 7 x 7°
- **Typical applications:** Fish finding and hydrographic echo sounders, Catch monitoring systems
- **Order number, transducer:** KSV-203005
- **Order number, transducer cable:** 642–078215
- **GPT connection:** *Dual frequency, single beam transducer* on page 74

All 70 khz transducers

The following 70 khz transducers are available.

Simrad ES70-11

- **Type and frequency:** Split beam, 70 kHz
- **Opening angle:** 11°
- **Typical applications:** Fish finding and scientific echo sounders
- **Order number, transducer:** KSV-110280
- **Order number, transducer cable:** 642–075072
- **GPT connection:** *Split beam transducer* on page 71

Simrad ES70-7C

- **Type and frequency:** Split beam, 70 kHz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and scientific echo sounders
- **Order number, transducer:** KSV-203678
- **Order number, transducer cable:** 642–078215
- **GPT connection:** *Split beam transducer* on page 71

All 120 khz transducers

The following 120 khz transducers are available.

Simrad 120-25

- **Type and frequency:** Single beam, 120 khz
- **Opening angle:** 10°
- **Typical applications:** Fish finding and hydrographic echo sounders
- **Order number, transducer:** KSV-062615
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad ES120-7

- **Type and frequency:** Split beam, 120 khz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and scientific echo sounders
- **Order number, transducer:** KSV-088277
- **Order number, transducer cable:** 642-075072
- **GPT connection:** *Split beam transducer* on page 71

Simrad ES120-7C

- **Type and frequency:** Split beam, 120 khz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and scientific echo sounders
- **Order number, transducer:** KSV-204580
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *Split beam transducer* on page 71

Simrad ES120-7DD

- **Type and frequency:** Split beam, 120 khz
- **Opening angle:** 7°
- **Typical applications:** Scientific echo sounders, towed array
- **Order number, transducer:** KSV-112417
- **Order number, transducer cable:** Shipyard supply
- **GPT connection:** *Deep water, split beam transducer* on page 75

Simrad ES120-7F

- **Type and frequency:** Split beam, 120 khz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and scientific echo sounders

- **Order number, transducer:** KSV-110553
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *Split beam transducer* on page 71

Simrad ES120-7G

- **Type and frequency:** Split beam, 120 khz
- **Opening angle:** 7°
- **Typical applications:** Scientific echo sounders
- **Order number, transducer:** KSV-112101
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *Split beam transducer* on page 71

Simrad ES120-2,5x10

- **Type and frequency:** Split beam, 120 kHz
- **Opening angle:** 2,5 x 9,5°
- **Typical applications:** Scientific echo sounders
- **Order number, transducer:** KSV-111154
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *Split beam transducer* on page 71

Simrad ES120-4x10

- **Type and frequency:** Split beam, 120 kHz
- **Opening angle:** 4,4 x 9°
- **Typical applications:** Scientific echo sounders
- **Order number, transducer:** KSV-203004
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *Split beam transducer* on page 71

All 200 kHz transducers

The following 200 kHz transducers are available.

Simrad 200-7C

- **Type and frequency:** Single beam, 200 kHz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and hydrographic echo sounders
- **Order number, transducer:** KSV-203378
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad 200-7F

- **Type and frequency:** Single beam, 200 kHz
- **Opening angle:** 7°
- **Typical applications:**Hydrographic echo sounders
- **Order number, transducer:** KSV-065414
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad 200-7G

- **Type and frequency:** Single beam, 200 kHz
- **Opening angle:** 7°
- **Typical applications:** Hydrographic and scientific echo sounders, Portable
- **Order number, transducer:** KSV-210895
- **Order number, transducer cable:** 642–076492
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad 200-28E

- **Type and frequency:** Single beam, 200 kHz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and hydrographic echo sounders
- **Order number, transducer:** KSV-109178
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad 200-35

- **Type and frequency:** Single beam, 200 kHz
- **Opening angle:** 3°
- **Typical applications:** Hydrographic echo sounders
- **Order number, transducer:** KSV-068181
- **Order number, transducer cable:** 642-016604
- **GPT connection:** *Single beam, normal power transducer* on page 68

Simrad ES200-7

- **Type and frequency:** Split beam, 200 kHz
- **Opening angle:** 7°

- **Typical applications:** Fish finding and scientific echo sounders
- **Order number, transducer:** KSV-202718
- **Order number, transducer cable:** 642-075072
- **GPT connection:** *Split beam transducer* on page 71

Simrad ES200-7C

- **Type and frequency:** Split beam, 200 kHz
- **Opening angle:** 7°
- **Typical applications:** Fish finding and scientific echo sounders
- **Order number, transducer:** KSV-203003
- **Order number, transducer cable:** 642-078215
- **GPT connection:** *Split beam transducer* on page 71

Simrad 38/200 Combi C

For information about this transducer, see *All 38 kHz transducers* on page 145

Simrad 38/200 Combi D

For information about this transducer, see *All 38 kHz transducers* on page 145

Simrad 38/200 Combi W

For information about this transducer, see *All 38 kHz transducers* on page 145

Simrad 50/200 Combi C

For information about this transducer, see *All 50 kHz transducers* on page 147

Simrad 50/200 Combi D

For information about this transducer, see *All 50 kHz transducers* on page 147

All 710 kHz transducers

The following 710 kHz transducers are available.

Simrad 710-36E

- **Type and frequency:** Single beam, 710 kHz
- **Opening angle:** 2,8°
- **Typical applications:** Hydrographic and scientific echo sounders
- **Order number, transducer:** KSV-089292
- **Order number, transducer cable:** 642-016604

- **GPT connection:** *Single beam, normal power transducer* on page 68

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